PHILIPS

Tektronix
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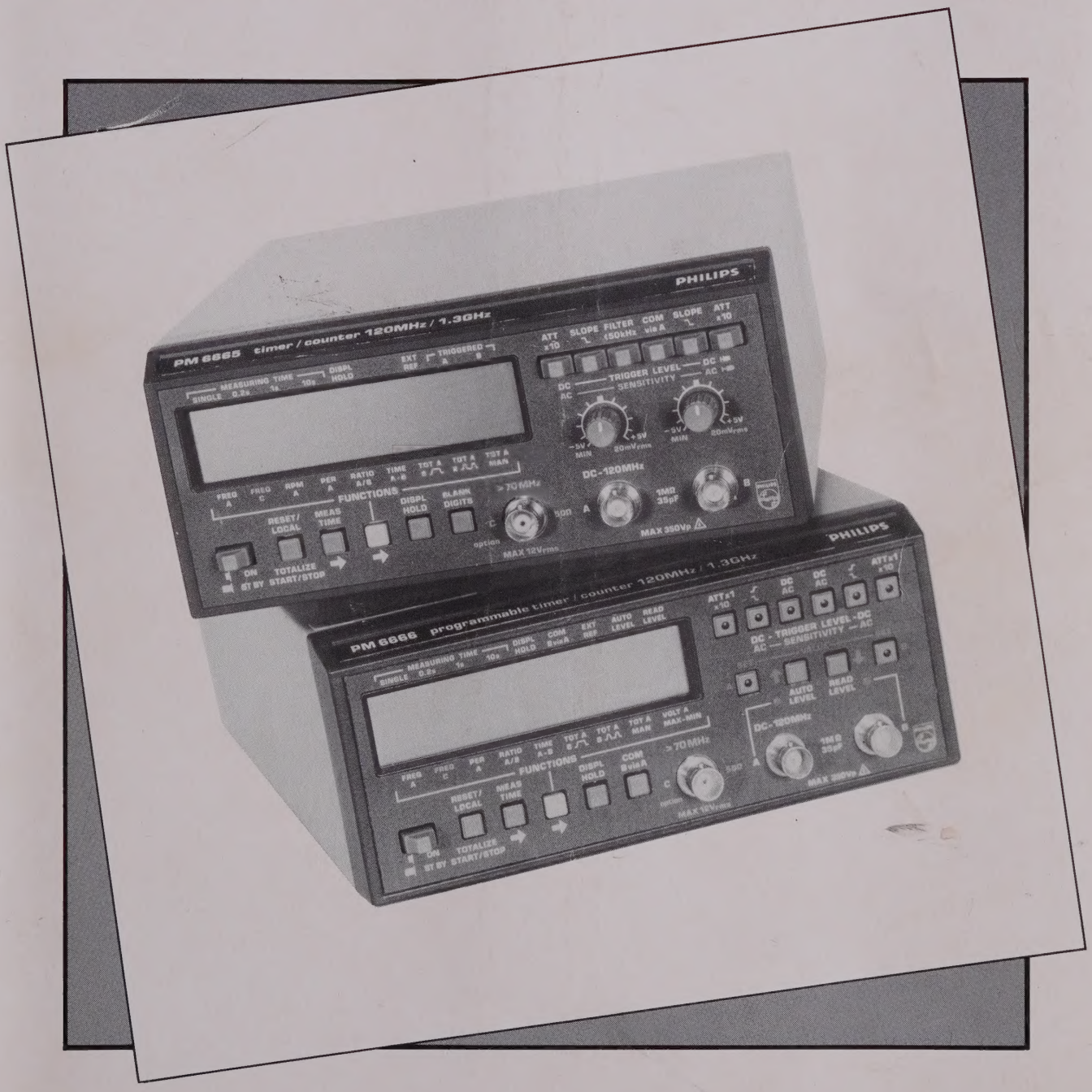
PHILIPS

Timer/Counters
PM 6665 and PM 6666

Service Manual

TEST & MEASUREMENT – CUSTOMER SUPPORT



9499 465 01311
90-10 Second edition

Important

As the instrument is an electrical apparatus, it may be operated only by trained personnel. Maintenance and repairs may also be carried out only by qualified personnel.

Please note

In correspondence concerning this instrument, please quote the type number and serial number as given on the type plate.

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INTRODUCTION

This Service Manual supports the Philips PM 6665 and PM 6666 Timer/Counters.

Information valid for only one of the types is followed by the type number within parentheses.

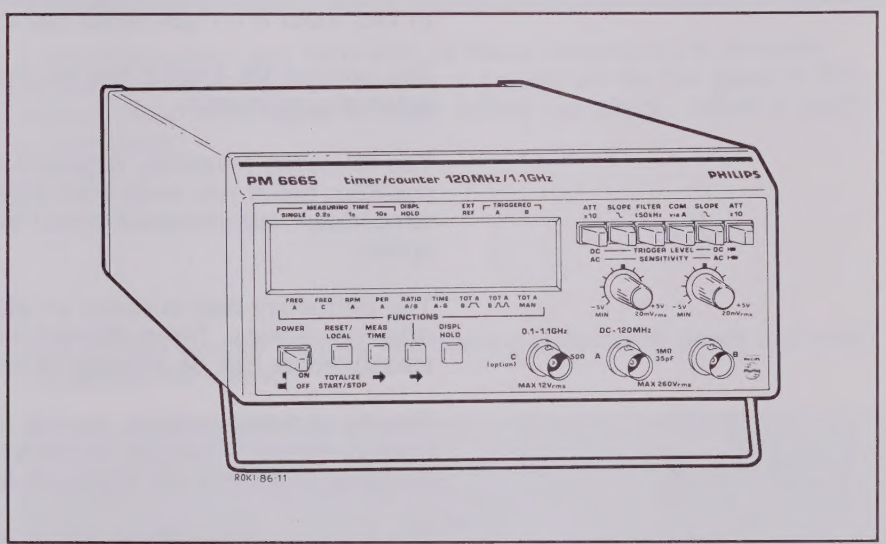

Figure 1. PM 6665.

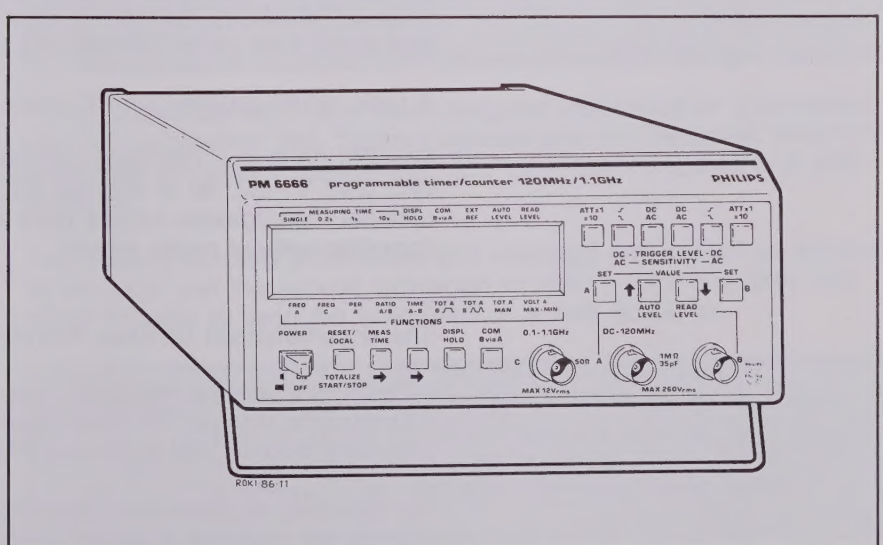

Figure 2. PM 6666.

The Philips PM 6665 and PM 6666 Timer/Counters are bench type portable Reciprocal Universal Timer/Counters. They can make following types of measurement:

- Frequency up to 120 MHz.
- Frequency up to between 1.0 and 1.3 GHz depending on version (option).
- Revolutions per minute (PM 6665).
- Period measurements.
- Ratio measurements between two frequencies.
- Time interval between two events.
- Pulse totalizing during a pulse in a second signal.
- Pulse totalizing between two pulses in a second signal.
- Pulse totalizing between two manual presses of a button.
- Positive and negative peak voltage measurements (PM 6666).

The measurement inputs A and B are identical, and have an input impedance of 1 Mohm. Both inputs have attenuators, slope selectors, trigger level/sensitivity controls, DC/AC selection and trigger indicators. Both inputs can be connected together via a push button. In addition to this, input A on type 6665 has a 50 kHz low pass filter.

The optional HF input C has an input impedance of 50 ohm and an automatic attenuator.

The reference frequency is generated by a very stable 10 MHz crystal oscillator and if you need even higher stability a mathematically temperature compensated crystal oscillator (MTCXO) is available as an option.

The instrument also provides an input for an external frequency reference source. Three different measuring times plus single cycle measurement can be selected to obtain different resolution.

Results of measurements, as well as selected function, measuring time, presence of external frequency reference and for PM 6665 also triggering indicators are displayed on a nine digit LCD display.

The major functions of the PM 6665 counter, such as function and measuring time selection, and all functions of the PM 6666 counter can be controlled by a computer via an optional GPIB interface. In this case a "REMOTE" indicator is switched on at the display to indicate that some front panel controls are disabled.

A rack mount adapter for 19" racks is available as an option.

The PM 6665 and PM 6666 can be powered by 110...115 V or 220...240 V - 50, 60 or 400 Hz AC line voltage. For field use, the optional rechargeable battery pack and a carrying case allows operation without mains power.

The documentation of these instruments comprises:

- Operator's Manual, PM 6665 (one volume).
- Operator's Manual, PM 6666 (one volume).
- Service Manual, PM 6665 and PM 6666 (this volume).

For servicing an instrument both Operator's Manual and Service Manual are required. A pocket guide with short form information about GPIB commands is also available.

SAFETY INSTRUCTIONS

WARNING: These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that specified in the Operators' Manual unless you are fully qualified to do so.

Authorized service and calibration of these instruments is available worldwide. A list of service centers is printed on the last page of this manual. Read this chapter carefully before you check, adjust or repair an instrument.

Caution & Warning Statements

You will find specific warning and caution statements where necessary throughout the manual.

CAUTION: indicates where incorrect operating procedures can cause damage to, or destruction of, equipment or other property.

WARNING: indicates a potential danger that requires correct procedures or practices in order to prevent personal injury.

These Timer/Counters have been designed and tested in accordance with IEC publication 348, Safety Requirements for Electronic Measuring Apparatus for class 1 instruments, and have been supplied in a safe condition.

This manual contains information and warnings that should be followed by the user and the service technician to ensure safe operation and repair in order to keep the instrument in a safe condition.

WARNING: The opening of covers or removal of parts, except those to which access can be gained by hand, is likely to expose live parts and accessible terminals which can cause death.

The instrument must be disconnected from all voltage sources before it is opened.

Remember that the capacitors inside the instrument retain their charge even if the instrument has been disconnected from all voltage sources.

Grounding

These instruments are connected to ground via sealed three-core power cables, which must be plugged into socket outlets with protective ground contacts. No other method of grounding is permitted for these instruments. The ground symbol on the rear panel indicates where the protective ground lead is connected inside the instrument. Never remove or loosen this screw.

When the instrument is brought from a cold to a warm environment, condensation may cause hazardous condition. Therefore ensure that the grounding requirements are strictly met.

Power extension cables must always have a protective ground conductor.

WARNING: Any interruption of the protective ground conductor inside or outside the instrument, or disconnection of the protective ground terminal, is likely to make the instrument dangerous. Do not intentionally disrupt the protective grounding.

Line Voltage Setting

Before connecting an instrument to the line, ensure that it is set to the local line voltage. On delivery the instrument is either set to 115 V or 230 V as indicated on the line voltage selector on the rear panel. If the line voltage setting is incorrect, set the line voltage selector in accordance with the local voltage before connecting the instrument to the line. See Operators' Manual.

Replacing Components in Primary Circuits

Components that are important for the safety of these instruments may only be renewed by components obtained from your local Philips organization. After repair in the primary circuits, perform the safety inspection and tests, as described in the chapter *"Repair".*

Fuses

These instruments are protected by thermal fuses inside the transformers. If a transformer has been hot enough for a fuse to blow, the complete transformer will be unsafe and must be replaced. An ordinary fuse protects the battery option. If this fuse must be replaced, use a 20 x 5 mm 1.6 A slow blow fuse.

QUICK FAULT-FINDING

These instruments are highly integrated Timer/Counters with dedicated LSI counter circuits and microcontrollers that control the complete units. Providing the microcontroller works correctly it can help you to locate faulty parts by running test programs and generating stable patterns on the bus. If the microcontroller does not work or the fault is in a part of the counter that cannot be accessed by the micro-controller, traditional faultfinding must be performed.

Where to Start

After reading the safety instructions, start by performing the checks in the chapter on *"Function Check"*. These tests can be performed without dismantling the instrument. With the results of the function checks at hand, turn to the chapter on *"Repair"* for fault-finding and repair instructions. When the instrument has been fixed, always do the safety inspection and test after repair, as described in the chapter *"Repair"*, then do the checks in the chapter *"Performance Check"*. Recalibrate if required by following the adjustment instructions in the chapter *"Adjustments"*.

Instruments Required

To be able to test the instrument properly using this manual you will need the equipment listed below. The list contains not only suggested Philips and Fluke test equipment, but also the critical parameter specifications required if you have instruments from other manufacturers.

Equipment type	Specifications	Suggested type No.
Adapter BNC banana		Philips PM 9051 or Fluke Y9109
Adjustable power supply	4 V DC	Philips PE 1537
Attenuator	20 dB attenuation	Fluke Y9102
BNC T-piece		Philips PM 9067 or Fluke Y9107
Delay cable BNC-BNC	10 ns delay	Philips PM 9588
Digital multimeter	0-250 V AC, 0-10 V DC	Philips PM 2518 or Fluke 77
Frequency reference	10 MHz, accuracy 3×10^{-8}	Philips PM 9691
HF signal generator	1300 MHz	Fluke 6070A or Wavetek 2002A
LF oscilloscope	DC-10 MHz/10 mV	Philips PM 3215
LF synthesizer	2 MHz	Philips PM 5192
Oscilloscope	min. 350 MHz	Philips PM 3295
Probe	10 Mohm input impedance	Philips PM 8922
Pulse generator	1 µs/250 ns	Philips PM 5786
Resistor	1 ohm, 0.5 W	
Resistor	100 ohm, 0.5 W	
Room thermometer		
Screwdriver		ELCOMA 4822 310 50015
Termination	50 ohm, 1 W	Philips PM 9585 or Fluke Y9317

How to Replace Surface Mounted Devices

Most of the components in this instrument are mounted on the surface of the board instead of through holes in the board. These components are not hard to replace but they require another technique. If you do not have special SMD desoldering equipment follow the instructions below:

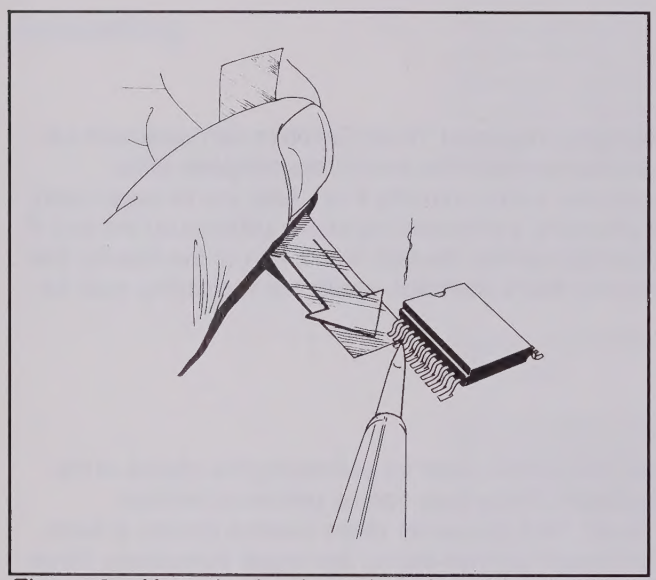

Figure 3. Heat the leads and push a thin aluminum sheet between the leads and the PC-board.

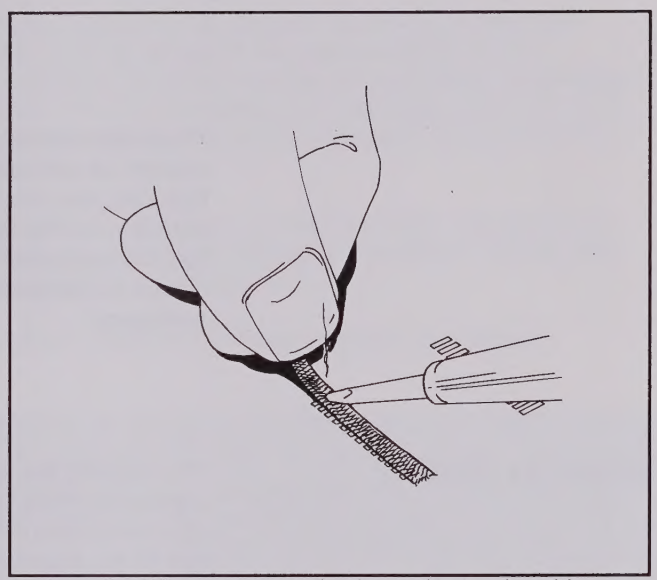

Figure 4. When removed, clean the pads with desoldering braid.

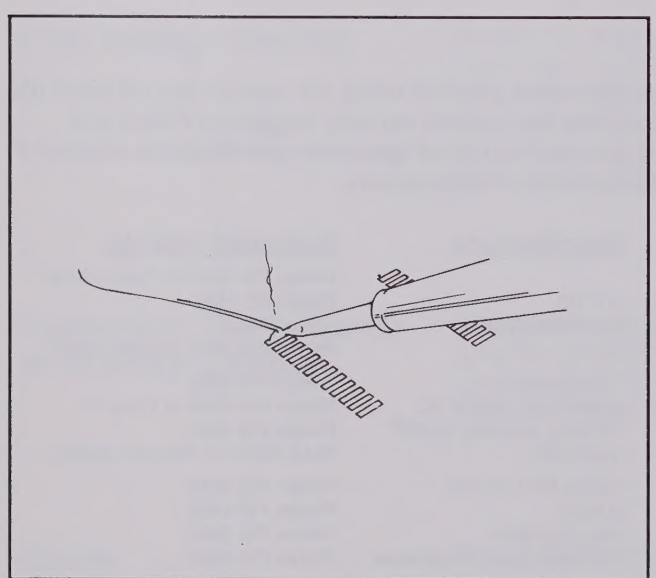

Figure 5. Place solder on one pad.

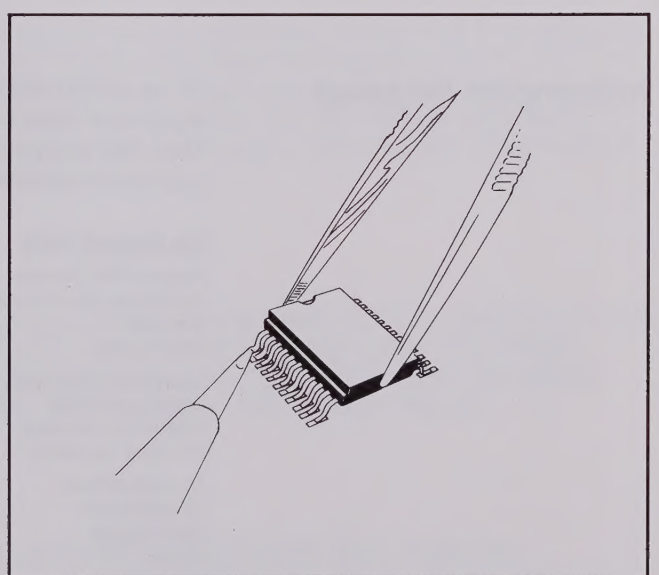

Figure 6. Attach the IC to the pad with solder.

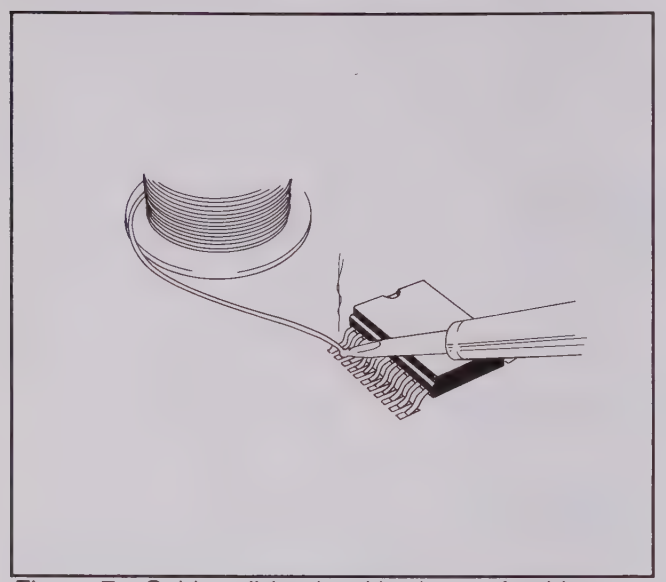

Figure 7. Solder all leads with plenty of solder; don't worry about short-circuits at this stage.

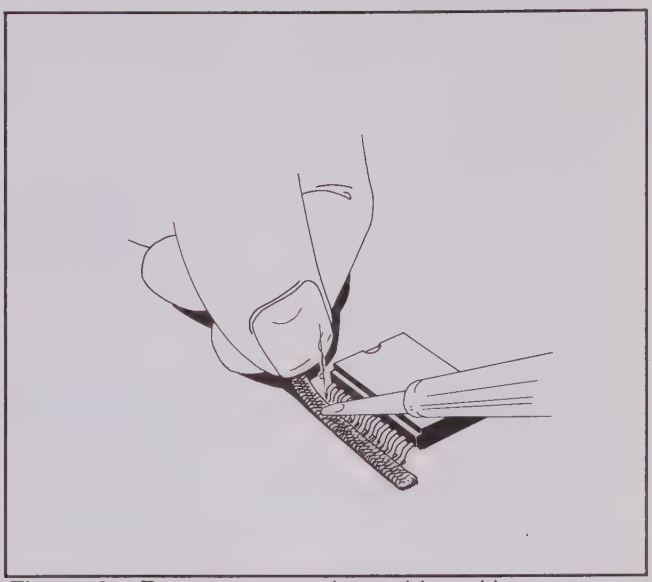

Figure 8. Remove excessive solder with desoldering braid.

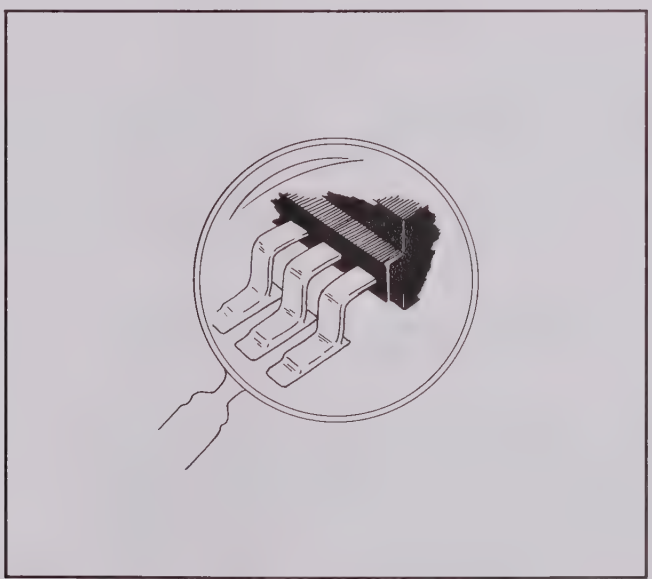

Figure 9. Use a strong magnifying glass to make sure there are no short-circuits or unsoldered leads.

DISMANTLING

Before describing the dismantling, a few words about designations of exterior parts and about options.

The designations in figure 10 are used in all descriptions throughout this manual.

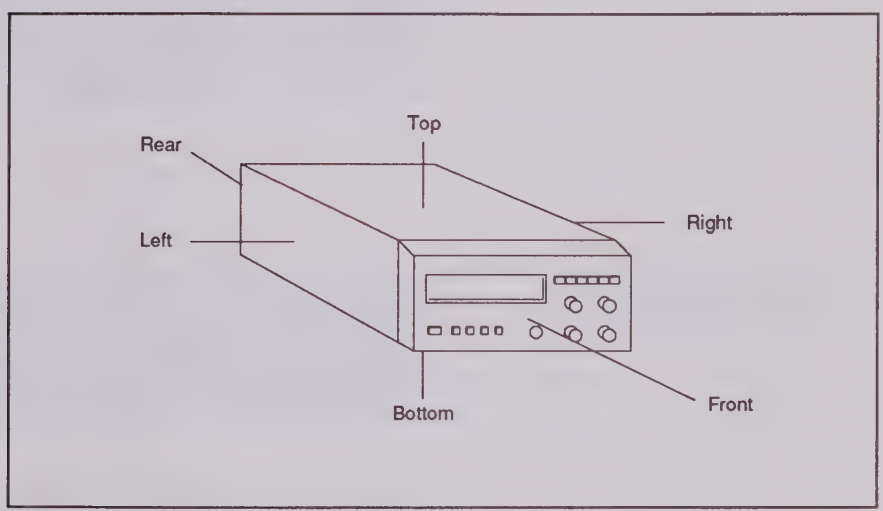

Figure 10. Exterior parts and directions.

The PM 6665 and PM 6666 are available with a number of options and accessories. Which of these are included can be identified by the labels on the rear panel. If no labels are fitted, the counter contains an *uncompensated crystal oscillator* and no options. The following labels exist:

PM 9604 GPIB Interface
PM 9605 Battery Unit
PM 9607 MTCXO Oscillator (time-base)
PM 9608 1.1 GHz HF Input
PM 9608B 1.3 GHz HF Input
PM 9615 1.0 GHz HF Input

The GPIB Interface and Battery unit cannot be fitted in one and the same instrument. On newer instruments, the strip in the upper edge of the front panel also indicates which inputs are fitted to the instrument, e. g. 120 MHz/1.3 GHz means that a PM 9608B is fitted.

The location of these optional parts is illustrated by figure 11 on the next page.

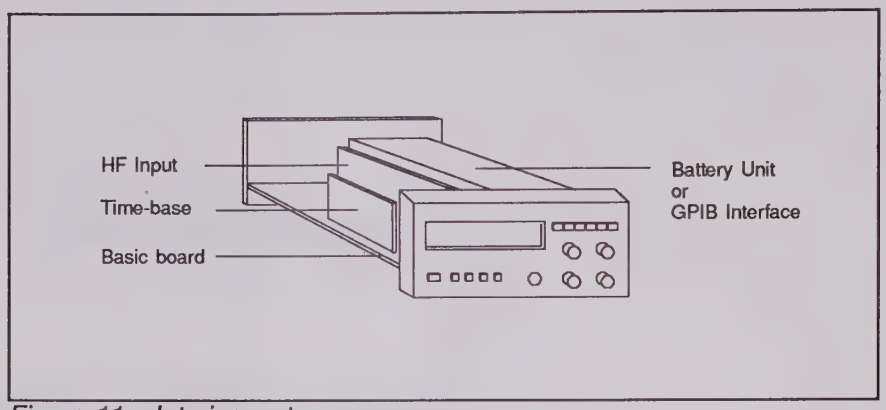

Figure 11. Interior parts.

WARNING: When you remove the cover you will expose live parts and accessible terminals which can cause death.

Removing the Cover

WARNING: Although the power switch is in the off position, the line voltage is present on the printed circuit board.

1) Make sure the power cable is disconnected.
2) Loosen the two screws in the rear feet (see figure 12).
3) Grip around the front panel and gently pull the Timer/Counter out of the cover.

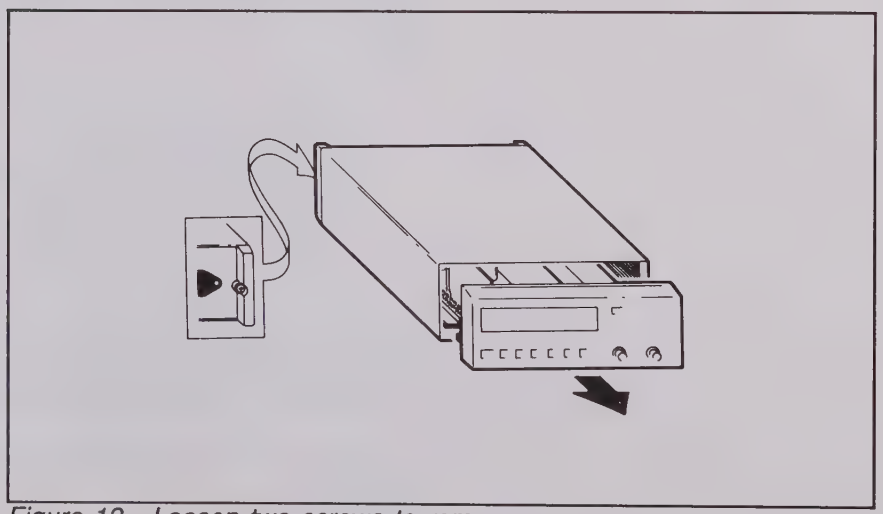

Figure 12. Loosen two screws to remove cover.

Fitting the Cover

The RFI shielding depends on proper grounding of the cover via the two screws in the rear feet. Always tighten these screws firmly.

HF Input

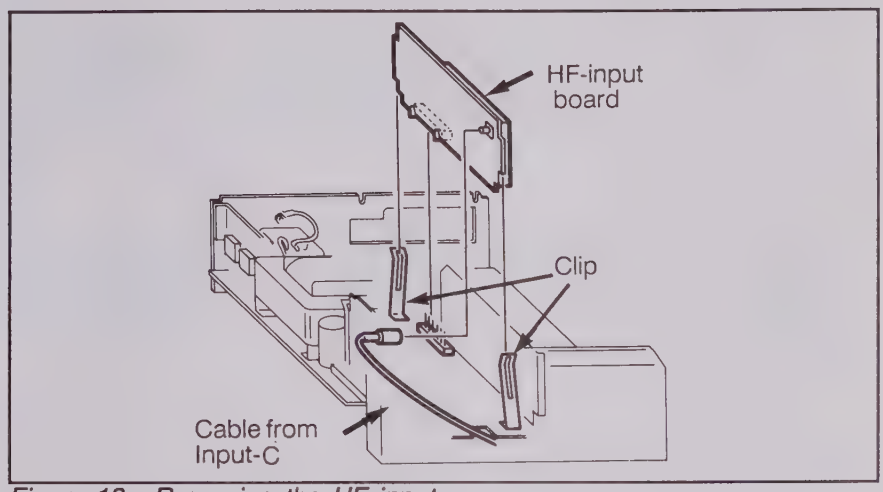

Figure 13. Removing the HF input.

The HF input is located to the left of the screening plate in the middle of the Timer/Counter.

1) Remove the cover of the Timer/Counter.
2) Disconnect the cable from the mini-coax connector on the HF input.
3) Prize the clips apart so they disengage from the tongues of the HF input printed-circuit-board and lift the board straight up.
4) When fitting the HF input, make sure that the connector pins fit exactly in the holes in the connector housing.

Time-Base Oscillator

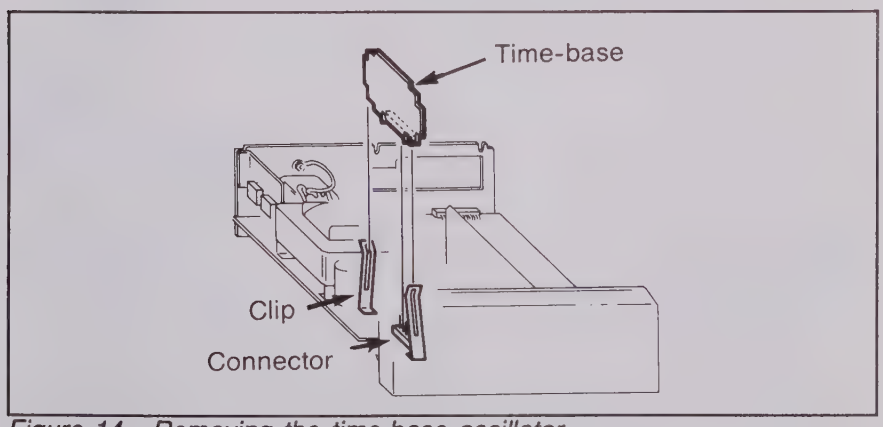

Figure 14. Removing the time-base oscillator.

The time-base oscillator is located in the front left corner of the Timer/Counter, behind the display.

1) Remove the cover of the Timer/Counter.
2) Prize the clips apart and lift out the oscillator.
3) When fitting the oscillator, ensure that the connector pins fit exactly in the holes in the connector housing.

GPIB Interface

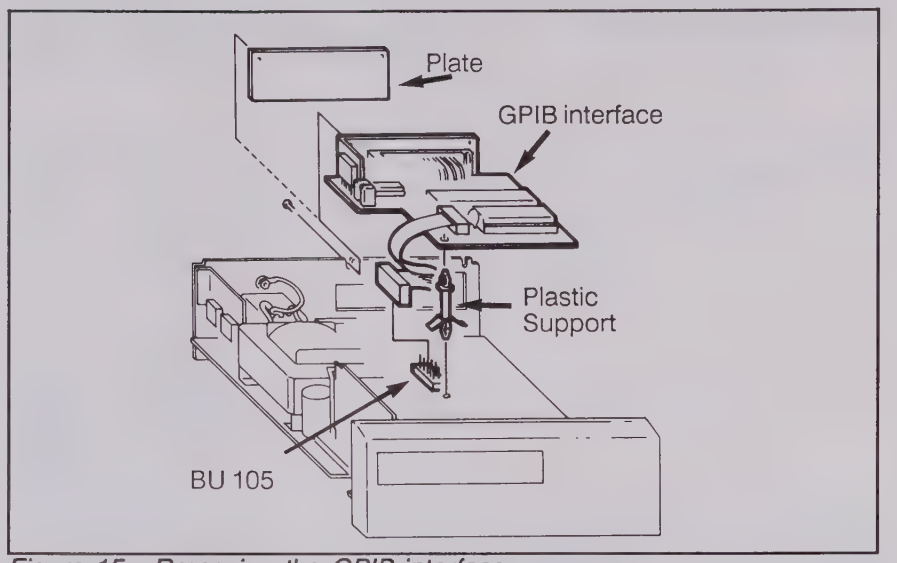

Figure 15. Removing the GPIB-interface.

1) Remove the cover.
2) Loosen the two screws holding the GPIB interface to the rear panel.
3) Disengage the interface from the plastic support next to BU105 on the basic board.
4) Disconnect the GPIB interface cable from BU105.

Battery Unit

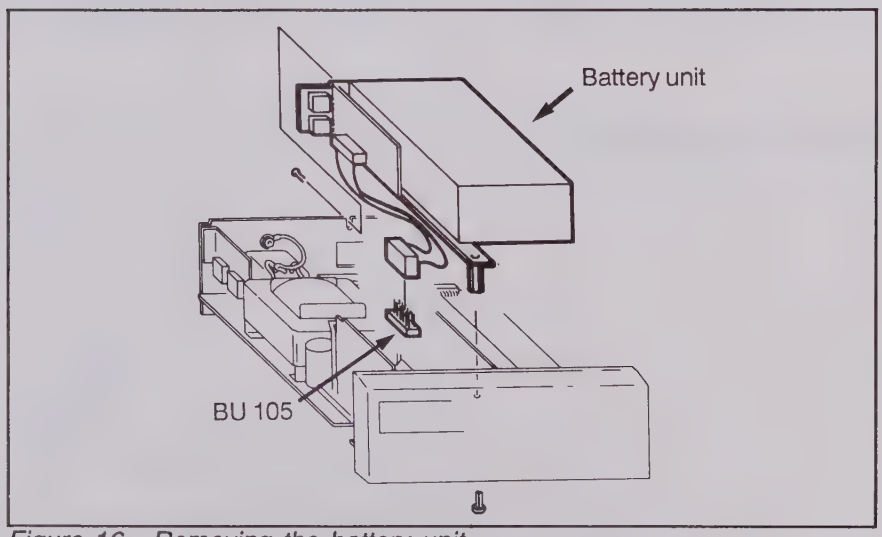

Figure 16. Removing the battery unit.

1) Remove the cover.
2) Loosen the two screws holding the battery unit to the rear panel.
3) Loosen the screw holding the battery unit to the basic PC-board panel.
4) Disconnect the battery unit cable from BU105 on the basic PC board.

FUNCTIONAL DESCRIPTION

This chapter is divided into two parts. The first part, *"Block Diagram Description"*, comprises block diagram for the entire counter and a basic board layout. The second part, *"Circuit Descriptions"*, comprises detailed descriptions for the blocks.

Block Diagram Description

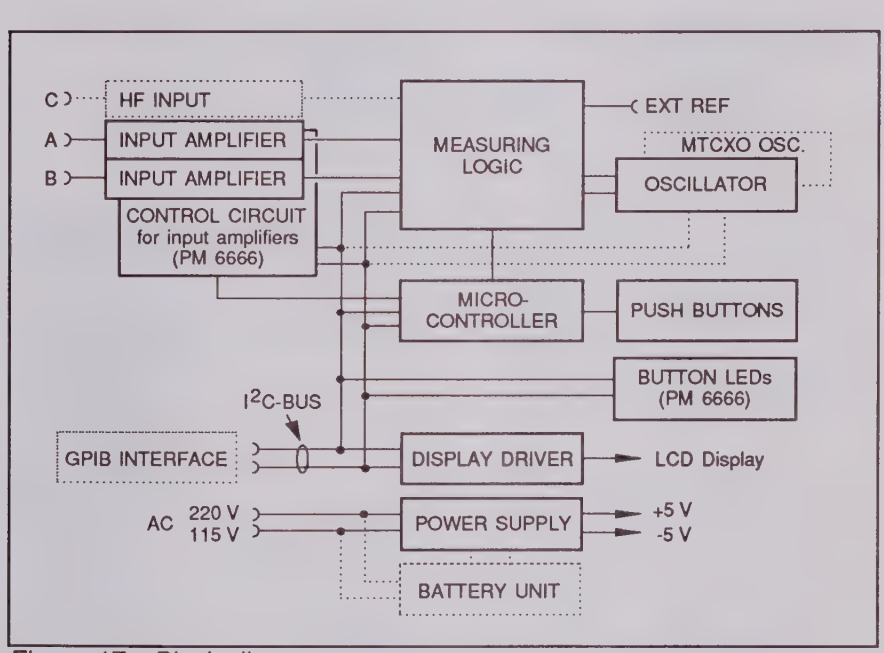

Figure 17. Block diagram.

The counter contains the following functions (locations, see next page):

- **INPUT AMPLIFIERS**, shape the input signals to well defined pulses.
- **CONTROL CIRCUIT** (PM 6666), controls on/off states for AC/DC-, ATT-, and COM-functions.
- **MEASURING LOGIC**, one-chip counter containing the synchronization circuitry, main gates and counting registers.
- **MICRO-CONTROLLER**, controls the data flow inside the counter.
- **I²C-BUS**, internal address- and data-bus for communication between micro-controller, measuring logic, and options.
- **OSCILLATOR**, generates a stable 10 MHz clock signal.
- **PUSH BUTTONS**, form the man-machine control interface.
- **DISPLAY DRIVER**, feeds information to the LCD display.
- **POWER SUPPLY**, generates supply voltages of +5 V and -5 V.

The following functions are available as options:

- **HF INPUT**, permits measurement of high frequency signals.
- **MTCXO OSCILLATOR**, gives a temperature-compensated time-base for higher accuracy.
- **GPIB INTERFACE**, permits communication with the counter from an external GPIB bus.
- **BATTERY UNIT**, makes the counter temporarily independent of the power line.

• *Basic Board Layout*

The basic board layout, including outlines of the functional blocks, is illustrated by figure 18.

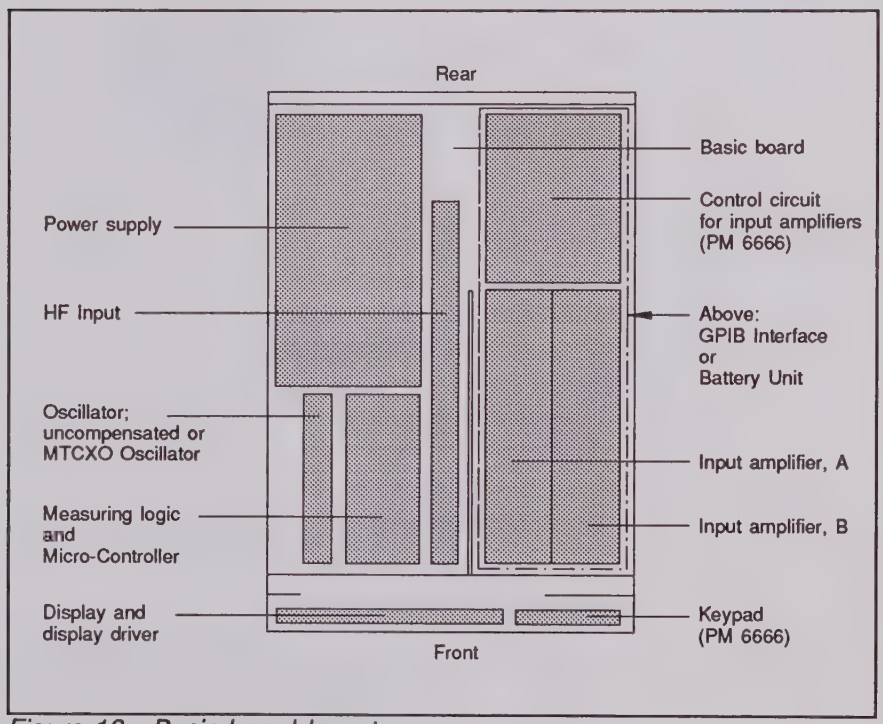

Figure 18. Basic board layout.

Circuit Description

Conventions

Components which are not important for the function are omitted from the figures in this chapter. Furthermore, where more than one component is connected in series or parallel, only one component is mentioned. For the complete set of components see the circuit diagrams in chapter: "Drawings and Diagrams".

When a circuit is similar for the PM 6665 and PM 6666 - but the component numbers differ, these numbers are written first for the PM 6665 and then, within parentheses, for the PM 6666. Example: PM6665(6666).

• Input Amplifier

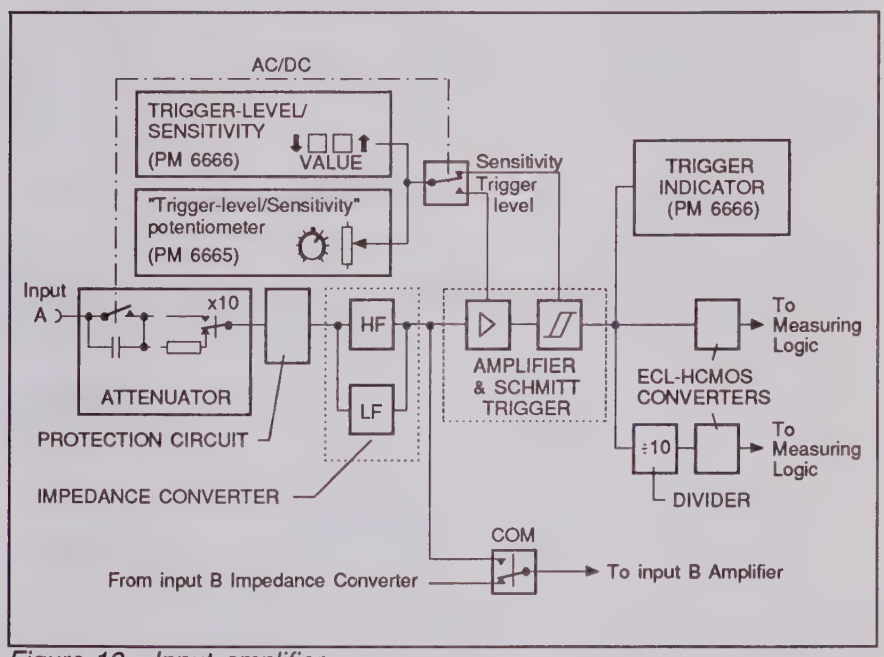

Figure 19. Input amplifier.

The input amplifiers A and B measure signals at frequencies up to 120 MHz. The amplifiers are identical except for the LP-filter in amplifier A (PM 6665), and the frequency divider, also in amplifier A. Only amplifier A will be described.

The amplifier can be either AC- or DC-coupled by the switches in the "Trigger-level/Sensitivity" potentiometers (PM 6665) or by a relay via the AC/DC push-button (PM 6666).

The input amplifier contains the sub-functions shown in figure 19 above. These are individually described on the following pages:

- ATTENUATOR . . . . . page 18
- PROTECTION CIRCUIT 19
- IMPEDANCE CONVERTER 19
- AMPLIFIER & SCHMITT TRIGGER 20
- TRIGGER-LEVEL/SENSITIVITY (PM 6666) 21
- TRIGGER INDICATOR (PM 6666) 22
- DIVIDER 22
- ECL-HCMOS CONVERTER 23

Attenuator

After the AC/DC-switch, the signal is fed to the attenuator circuitry which extends the input level range from ± 5 V to ± 50 V. The attenuator allows the level to be matched to the Schmitt trigger and to the dynamic range of the impedance converter.

The circuit is different in the PM 6665 and PM 6666.

PM 6665:

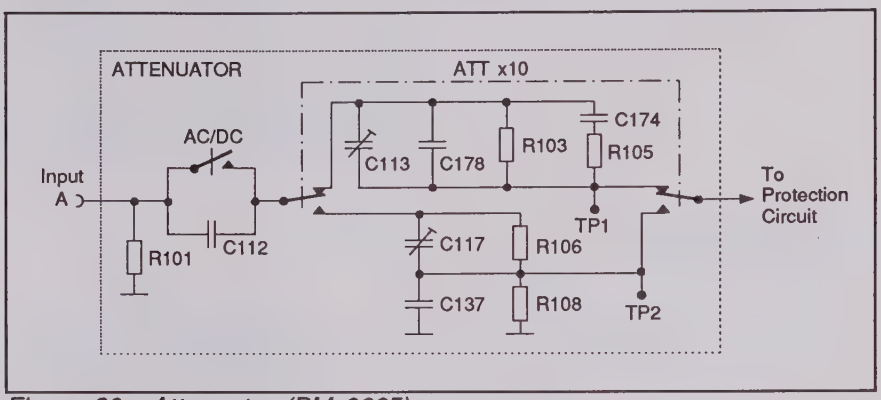

Figure 20. Attenuator (PM 6665).

R101 is the discharging resistor for C112.

ATT x1 The signal is attenuated to 1:2 by C113, C178, R103 and C174 + R105. Measuring point: TP1.

ATT x10 The signal is attenuated to 1:20 by potentially dividing between C117/R106 and C137/R108. Measuring point: TP2.

PM 6666:

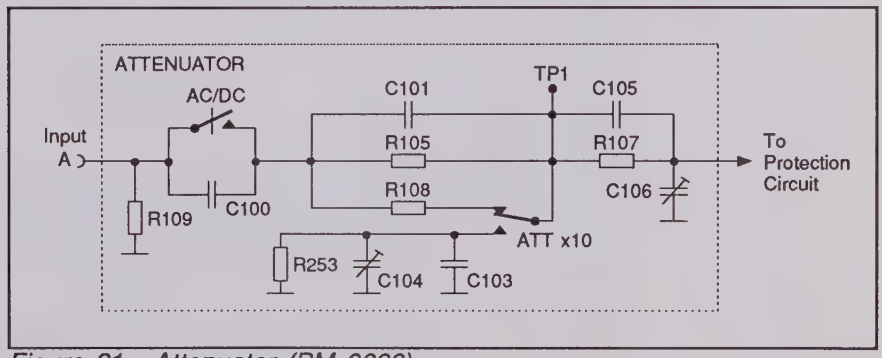

Figure 21. Attenuator (PM 6666).

R109 is the discharging resistor for C100.

A fixed attenuator is formed by C101, C105, R105, R107 and trimmer capacitor C106. Measuring point: TP1.

ATT x1 The signal is attenuated to 1:2.3 by connecting resistor R108 in parallel with C101/R105.

ATT x10 The signal is attenuated to 1:23 by connecting the fixed attenuator to the components R253, C104 and C103. Since these are connected to ground, a voltage divider is formed.

Protection Circuit

This circuit is similar for both types except for the component numbers.

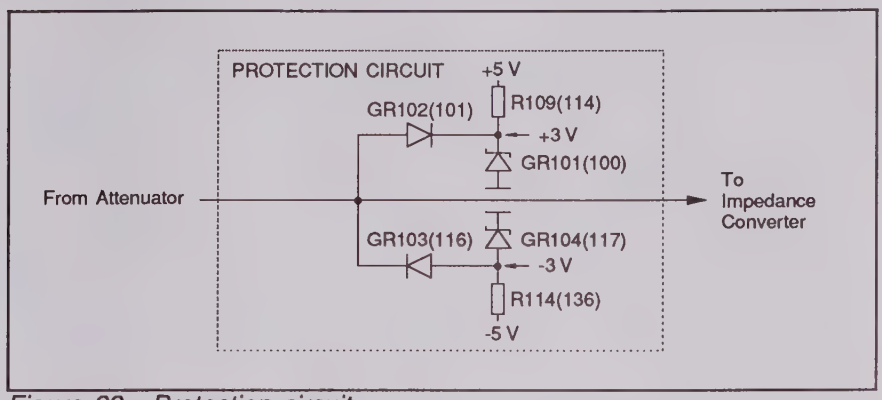

Figure 22. Protection circuit.

The signal is limited to the zener voltages +3 V and -3 V. This limitation protects the impedance converter from excessive input amplitudes.

Impedance Converter

The impedance converters are different in the two types, but they have in common a high input and low output impedance.

PM 6665:

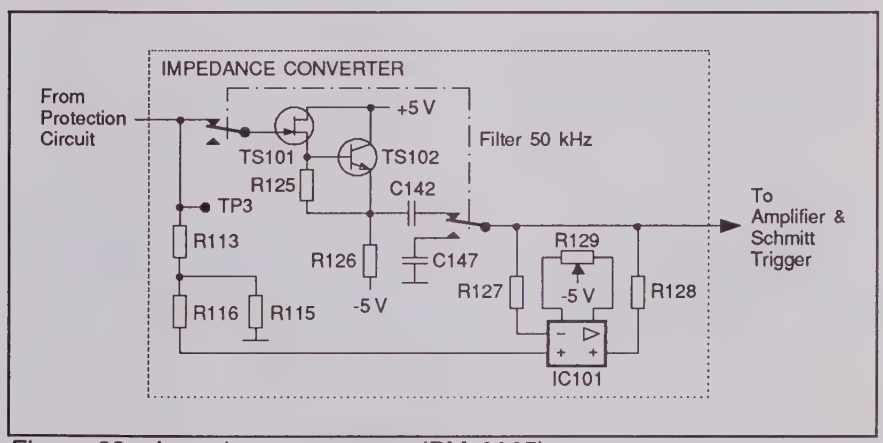

Figure 23. Impedance converter (PM 6665).

The circuit has an HF path via TS101/TS102 for signals above 150 kHz and an LF path via comparator IC101.

Potentiometer R129 sets the DC offset of the LF path.

Resistors R113, R115 and R116 form a voltage divider with the same attenuation as the HF path.

C147 and R128 form an LP filter when connected together by the push button "FILTER < 50 kHz".

Measuring point before the conversion: TP3.

PM 6666:

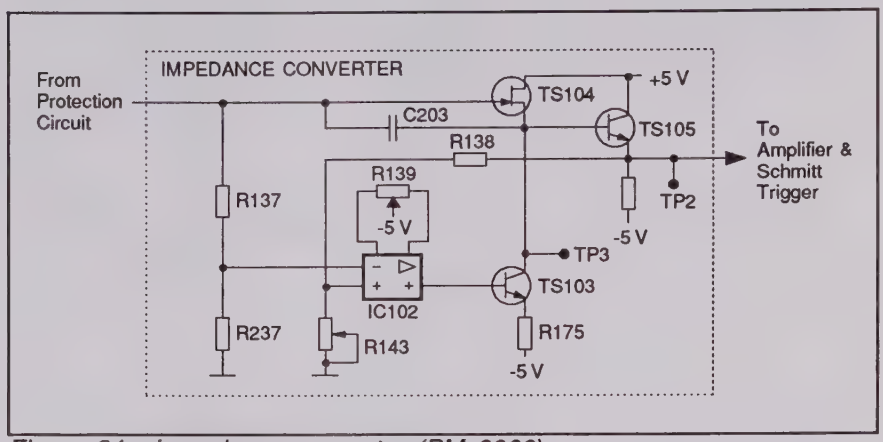

Figure 24. Impedance converter (PM 6666).

The circuit has an HF path via TS104/TS105 and an LF path for signals under 150 kHz via IC102/TS103.

IC102 is a comparator. Transistor TS103 is used as a current generator. Capacitor C203 lets very high frequencies bypass TS104. Potentiometer R139 sets the DC offset of the LF path.

The attenuation of the LF stage is set to the same as the HF stage by potentiometer R143.

Measuring points: TP2 (after conversion) and TP3 (TS103 - collector).

Amplifier & Schmitt Trigger

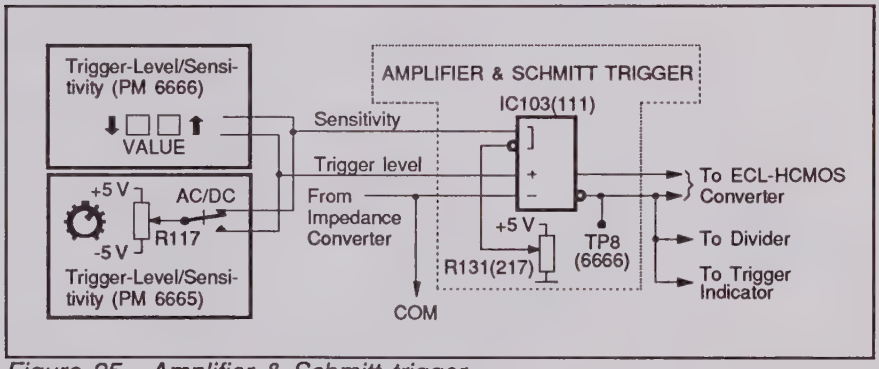

Figure 25. Amplifier & Schmitt trigger.

IC103(111) works as a wideband comparator. Maximum sensitivity is adjusted by potentiometer R131(217).

When AC is selected on the front panel the hysteresis band (sensitivity) can be set. This setting is done by potentiometer R117 "Trigger-level/Sensitivity" for PM 6665 and by the push buttons "VALUE" via "Trigger-Level Sensitivity" for PM 6666.

When DC is selected the trigger level can be set.

The pulse train from the Amplifier and Schmitt trigger (measuring point TP8 - PM 6666) is fed to the Measuring Logic via the ECL/HCMOS converter.

Trigger-Level/Sensitivity (PM 6666)

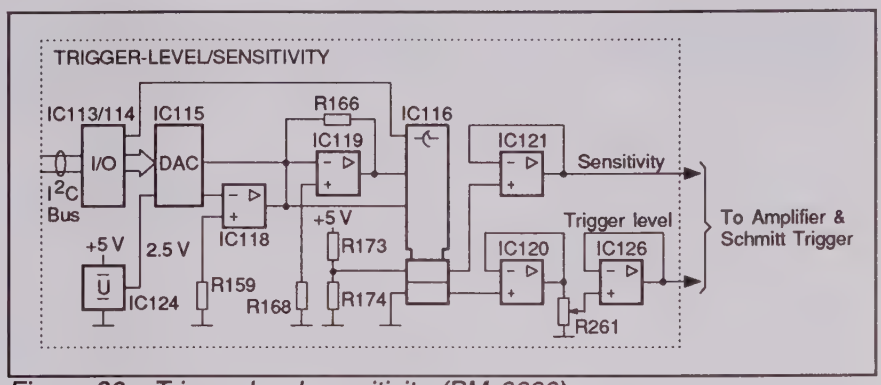

Figure 26. Trigger level sensitivity (PM 6666).

The micro-controller sends information to the I/O-port, IC113 and IC114, via the I^2C-bus to control digital-to-analog converter IC115 and analog switch IC116.

By using the voltage reference from IC124 the DAC creates a current output level set by the I^2C-bus. This current level is transformed to a voltage level by IC118.

To get a well defined zero point and full resolution in the positive range the DAC always generates a positive level. A negative level is created by inverting the positive level in IC119 (with the aid of resistors R166 and R168). Analog switch IC116 selects the positive or the negative level and transfers it either to the "sensitive" output or to the "trigger level" output for connection to the Amplifier & Schmitt Trigger.

"Trigger level" is set to zero (grounded) by IC116 when "sensitivity" is selected.

"Sensitivity" is set to maximum level by IC116 when "trigger level" is selected. Maximum level is given by potential divider R173/R174.

IC120 and IC121 are used as impedance converters.

R261 is used to adjust the trigger level. Corresponding component in the B input is R262, which is connected in parallel with a furthermore potentiometer; R263. The latter is selected (instead of R262) when the "Common via A" function is activated (see the complete circuit diagram in the chapter *"Drawings and Diagrams").*

Trigger Indicator (PM 6666)

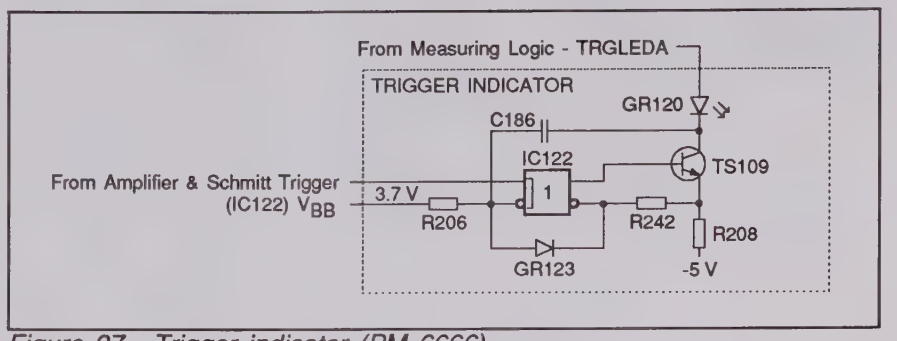

Figure 27. Trigger indicator (PM 6666).

The main component in the trigger indicator is the line receiver IC122 which works as a comparator. If the voltage from "Amplifier & Schmitt Trigger" is below the reference potential 3.7 V transistor TS109 conducts and LED GR120 is on. This indicates that the trigger level is set too low.

Consequently, the LED GR120 is off following a trigger level which is set too high.

When the input amplifier triggers correctly, transistor TS109 is turned on and off, i. e. the LED blinks. For high input frequencies the LED blinks with a fixed frequency of 3 Hz set by resistor R206 and capacitor C186. For input frequencies lower than 3 Hz, the LED blinks with the input frequency.

TRGLEDA from Measuring Logic goes low when the DAC is used to find the AUTOTRIG level. This prevents the trigger indicator from blinking during this time.

Divider

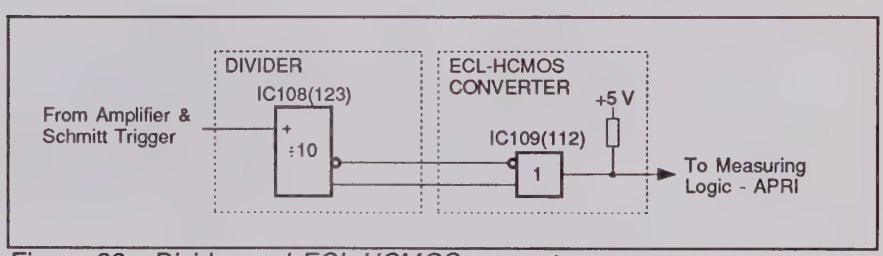

Figure 28. Divider and ECL-HCMOS converter.

In some measuring modes, the input signal must be divided by 10 before ECL to HCMOS conversion. This division is performed by circuit IC108(123).

ECL-HCMOS Converter

The signal from either the Amplifier & Schmitt Trigger or from the Divider (see figure 28) is converted by the ECL-to-TTL converter IC109(112). HCMOS-level is obtained by adding +5 V to the TTL-level via a resistor.

- ***Control Circuit (PM 6666)***

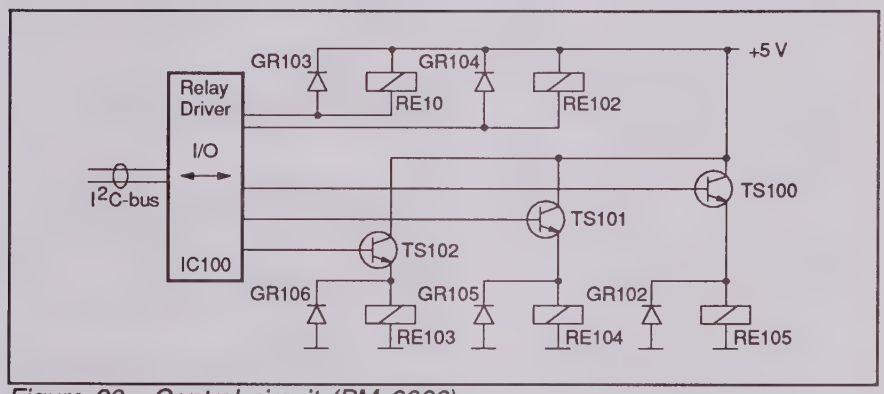

Figure 29. Control circuit (PM 6666).

This circuit handles the AC-, ATT-, and COM-function states of the input amplifiers.

Five relays are used to switch the on/off states of: AC A (RE101), AC B (RE102), ATT A (RE103), ATT B (RE104), and COM (RE105).

These relays are controlled from the I^2C-bus and driven by relay driver IC100. RE101 and RE102 are driven directly from the circuit, and RE103...RE105 are driven via the transistors TS100...TS102. The diodes GR102...GR106 reduce transients from the relay coils.

• Measuring Logic

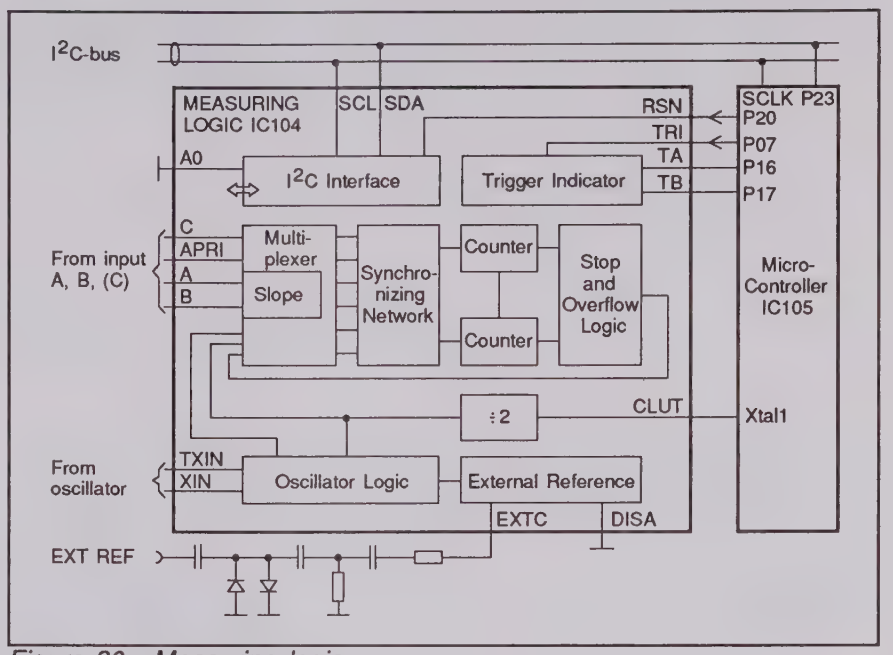

Figure 30. Measuring logic.

The Measuring Logic, which handles the actual measuring, is housed in a custom designed integrated circuit IC104.

Depending on the desired measuring input, the multiplexer selects A, B, C or APRI (APRI from the divider circuit).

The multiplexer receives the clock signal XIN via the Oscillator Logic. If the counter is equipped with an MTCXO oscillator, the signal TXIN is used for the input signal from the temperature oscillator.

If an external reference (EXT REF) is used, the clock signal is received via EXTC, then amplified and converted to HCMOS level in the External Reference circuit.

The clock signal is divided by two and is then fed to the Micro-Controller as CLUT.

The Synchronizing Network receives the selected input signal and the clock signal. The circuit synchronizes the clock signal to measuring start and measuring stop. This function prevents from the counting of incomplete input pulses at the start and stop of the measurement.

The input signal and the clock signal are counted in separate Counter registers. Some measuring modes only count one of the signals and then utilize the two registers connected in series.

The Stop and Overflow Logic tries to stop the measurement if the counter registers overflow. If it does not succeed, the counter indicates "Error OF".

The Measuring Logic and the Micro-Controller communicates via the I²C-bus.

A program flowchart, illustrating the program flow during a measuring cycle, is presented after the section on *"Micro-Controller and I²C-bus"*.

• Micro-Controller and I²C-Bus

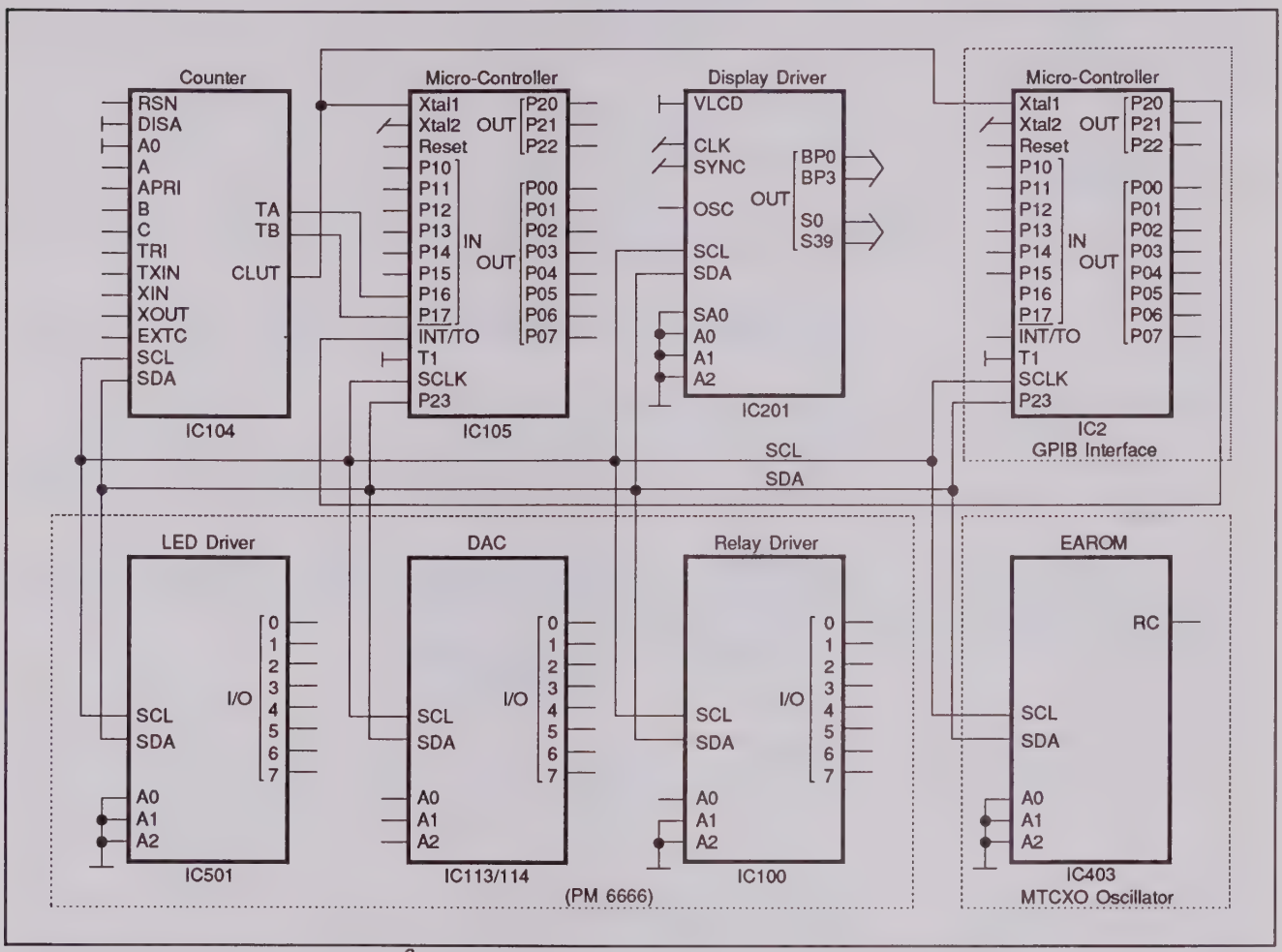

Figure 31. Micro-Controller and I²C-bus.

Micro-Controller

The Micro-Controller is a single chip microcomputer, IC105, with an internal 128 byte RAM and 6 kbyte ROM. It has 19 I/O-ports.

The Micro-Controller communicates with the other counter circuits via the I²C-bus. When information is to be sent on the bus the Micro-Controller outputs a 100 kHz clock signal on the clock line SCL. Before transmitting or receiving data it also sends the unique 1-byte-address of the receiving circuit on the data line SDA.

I²C-bus

The I²C-bus is a 2-line serial bus for the communication between the ICs. The Micro-Controller, IC105, controls the communication with the clock-line SCL. One or more slaves can read or write on the data-line SDA.

The SDA and SCL are high at stand by. All ICs connected to the bus can sink SDA to low as they are connected via open collector outputs.

The Micro-Controller starts and stops the communication by sending terms of start and stop:

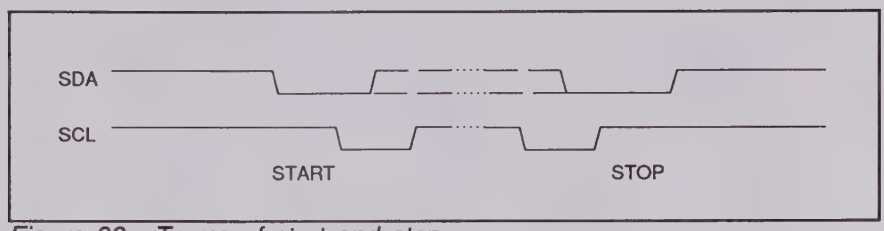

Figure 32. Terms of start and stop.

During transmission the SDA can be changed only when the SCL is low.

The Micro-Controller always begins to send the address information. The format of this address information is 7 address bits, one read/write bit, and one acknowledge bit.

Addressed slave accepts by keeping the SDA line low while the acknowledge bit (ACKN in figure 33) is sent by the Micro-Controller.

Example of addressing (address 30H):

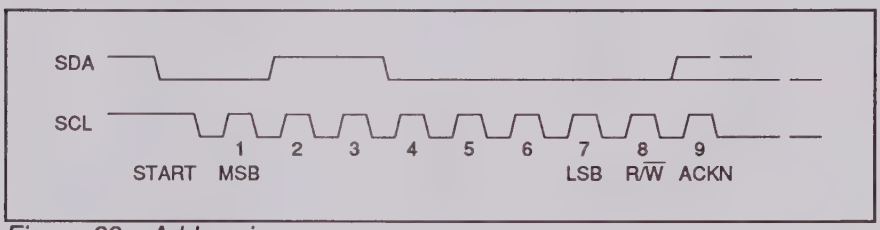

Figure 33. Addressing.

The read/write bit R/$\overline{W}$ has the following meaning:

R/$\overline{W}$ = 1 means information from the slave to the Micro-Controller.
R/$\overline{W}$ = 0 means information from the Micro-Controller to the slave.

The data information is sent after the address information. The format of the data information is 8 data bits followed by one acknowledge bit. The receiver accepts by keeping the SDA line low while the acknowledge bit (ACKN in figure 34) is sent.

Example of data transmission (data 9BH):

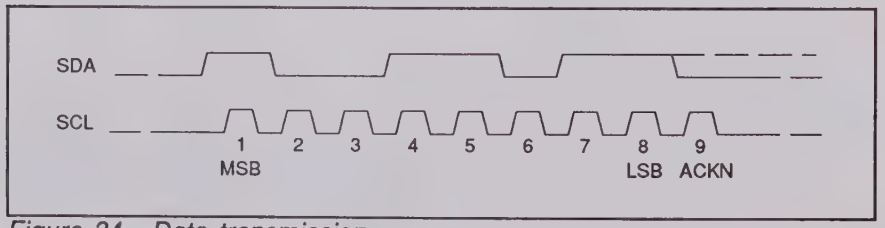

Figure 34. Data transmission.

Measuring Cycle

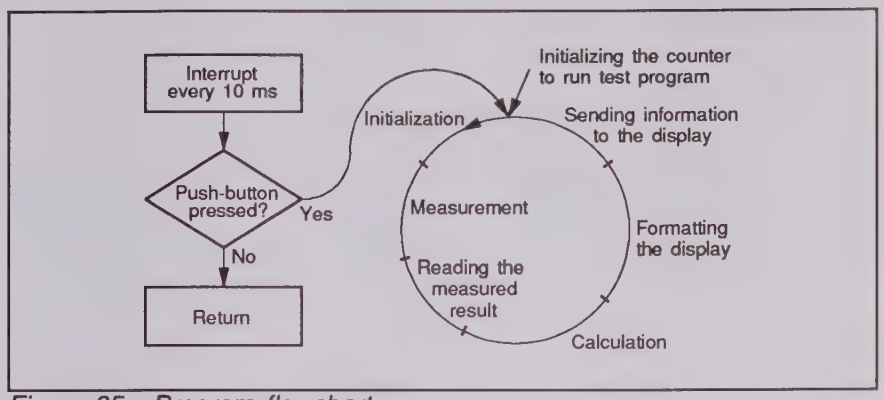

Figure 35. Program flowchart.

After power-up the Micro-Controller initializes the counter by running test programs and checking the version of the counter.

The Micro-Controller then orders the measuring logic to reset all registers. New setup commands are sent by the Micro-Controller.

The Micro-Controller requests the measuring logic to start the measuring cycle, then waits for the start of the measurement. When this happens, the Micro-Controller calculates the measuring time, and when this time has elapsed it instructs the Measuring Logic to stop the measuring cycle.

After the measuring cycle is completed the Micro-Controller calculates the result and format. This information is sent to the display.

- ***Oscillator***

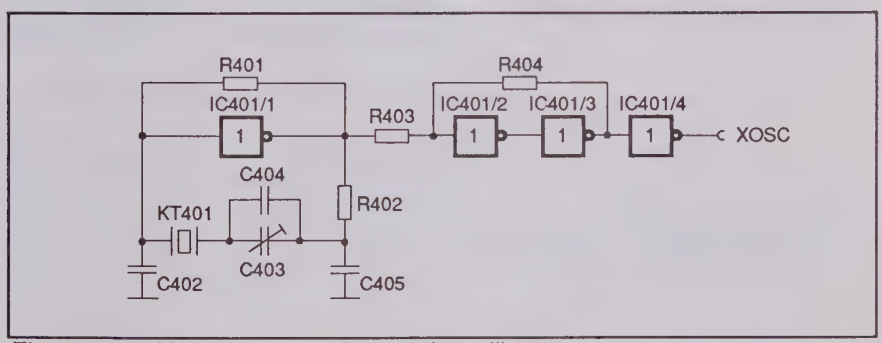

Figure 36. Uncompensated crystal oscillator.

The uncompensated crystal oscillator is a Pierce-type oscillator using an inverter, IC401/1, as the active element. The frequency is adjusted with trimmer capacitor C403. The fixed capacitor C404 sets the adjusting range. R401 sets the DC input level to IC401/1. R402 limits the power through the crystal to about 0.5 mW to get as good stability as possible.

R403, R404 and IC401/2-3 form a Schmitt trigger to eliminate ringing.

IC401/4 drives the output.

• Push Buttons

PM 6665:

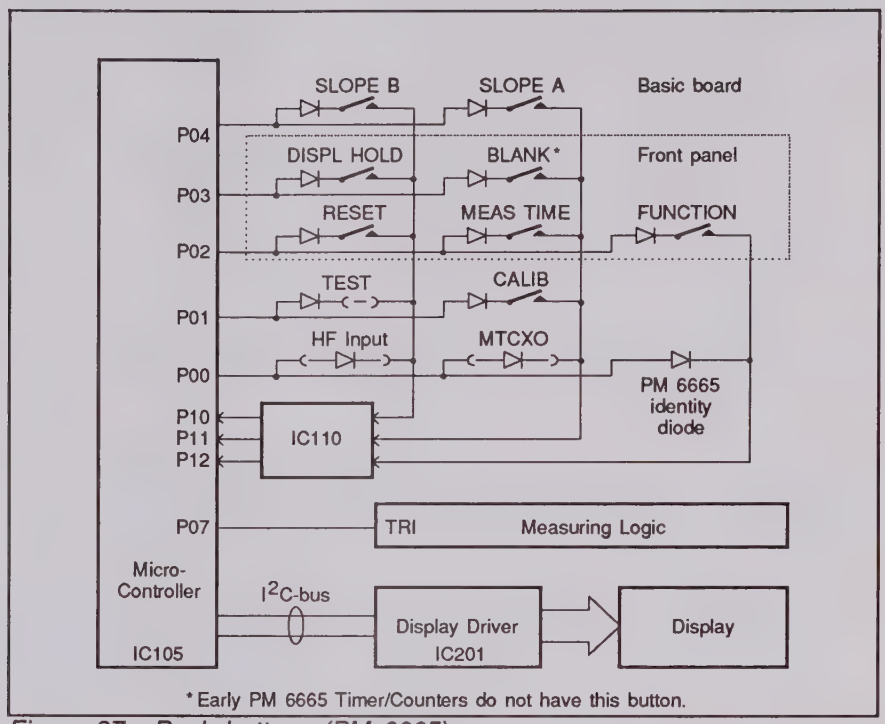

Figure 37. Push buttons (PM 6665).

Every 10 ms an interrupt is generated by the Micro-Controller. This interrupt starts a scanning of the push buttons to see if any button has been pressed. The scanning is controlled by the Micro-Controller and performed by reading the signals P10...P12 from the buttons while the signals P00...P04 are set high - one at a time.

The signal P07 is set high and resets the trigger indicator when any one of the signals P00...P04 is set high.

IC110 is used as an impedance converter.

This circuit also checks the identity of the timer/counter (the PM 6665 identity diode) and presence of any option diode indicating an MTCXO oscillator or a HF input.

PM 6666:

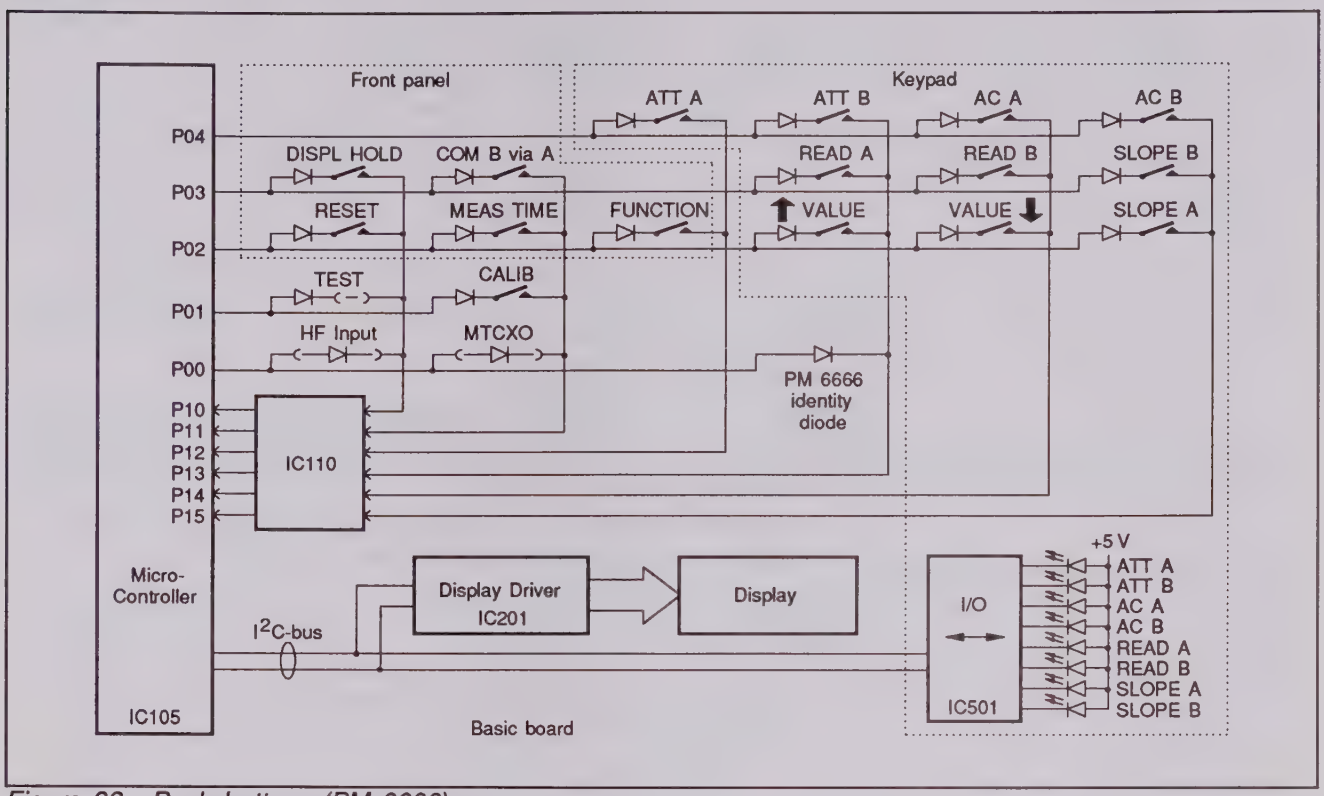

Figure 38. Push buttons (PM 6666).

Every 10 ms an interrupt is generated by the Micro-Controller. This interrupt starts a scanning of the push buttons to see if any button has been pressed. The scanning is controlled by the Micro-Controller and performed by reading the signals P10...P15 from the buttons while the signals P00...P04 are set high - one at a time.

IC110 is used as an impedance converter.

IC501 is used to drive the keytop LEDs.

This circuit also checks the identity of the timer/counter (the PM 6666 identity diode) and presence of any option diode indicating an MTCXO oscillator or a HF input.

• Display Driver

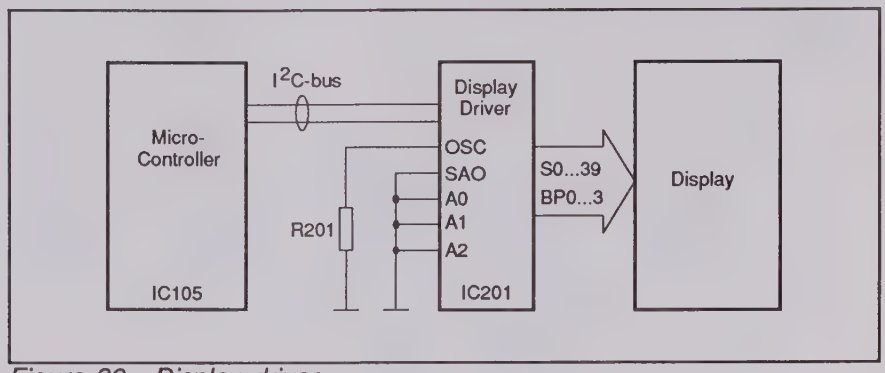

Figure 39. Display driver.

The Micro-Controller updates the display last in every measuring cycle by sending segment information via the I^2C-bus to the display driver IC201 (the display driver address is set by pins SAO, A0, A1 and A2).

The display driver converts the information to repetitive pulse trains before feeding the display (via S0...S39 and BP0...BP3).

The display is multiplexed by a factor of 1:3 to keep the number of input pins low.

R201 sets the frequency of the internal display driver oscillator.

• Power Supply

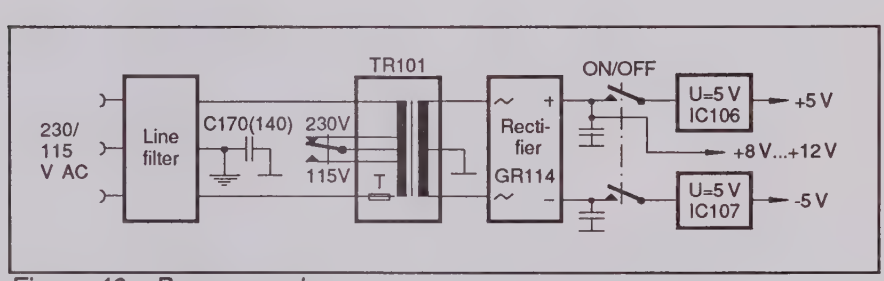

Figure 40. Power supply.

The PM 6665 and PM 6666 can be run from 115 or 230 V AC (±15%) mains supply, 46 - 440 Hz, or from built-in battery units.

The power supply generates regulated +5 V and -5 V for the logic, and unregulated +8...+12 V for the battery unit or the GPIB interface.

From the line filter the mains supply is fed to the mains selector and transformer TR101 which contains a built-in thermal fuse (T).

Capacitor C170(140) is connected between chassis and signal ground to improve signal ground to the rear panel input (EXT REF).

• HF Input (option)

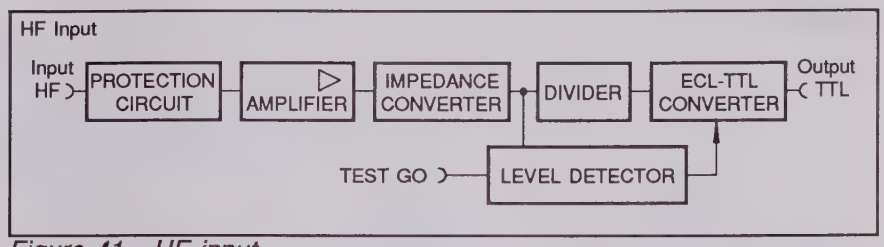

Figure 41. HF input.

The frequency range of the three types of HF Input are:

type PM 9608 100 MHz - 1.1 GHz
PM 9608B 70 MHz - 1.3 GHz
PM 9615 70 MHz - 1.0 GHz

The input, which is AC coupled, has a nominal impedance of 50 ohms. The main function of the circuit is the DIVIDER which divides the frequency by 256.

The HF Input contains following sub-functions (individually described below and on the two following pages):

- PROTECTION CIRCUIT
- AMPLIFIER
- IMPEDANCE CONVERTER
- DIVIDER
- ECL-TTL CONVERTER
- LEVEL DETECTOR

Protection Circuit

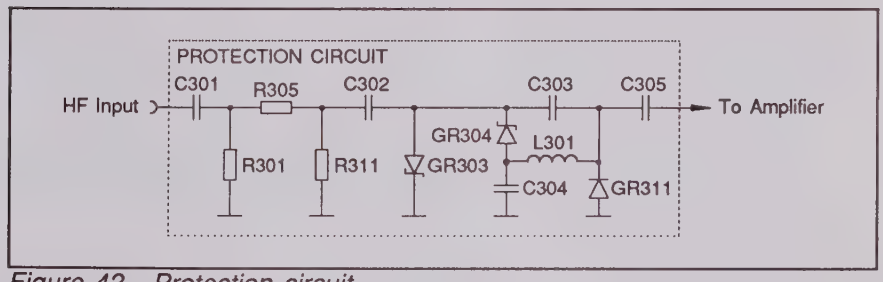

Figure 42. Protection circuit.

The HF Input is protected from excessive input levels by a resistive attenuator followed by a PIN-diode attenuator.

The resistive attenuator consists of the resistors R301, R305, and R311. The attenuation is 6 dB.

The diode attenuator consists of the components between the capacitors C302 and C305. It works in the following way:

Capacitor C304 will become negatively charged if the input amplitude increases above the forward voltage drop of the Schottky diodes GR303 and GR304.

If the DC voltage across capacitor C304 now becomes higher than the forward voltage drop across the PIN-diode GR311 (≈-0.65 V) current will flow through the diodes. This will decrease their impedance, which means that the amplitude over the diodes will be almost constant.

Amplifier

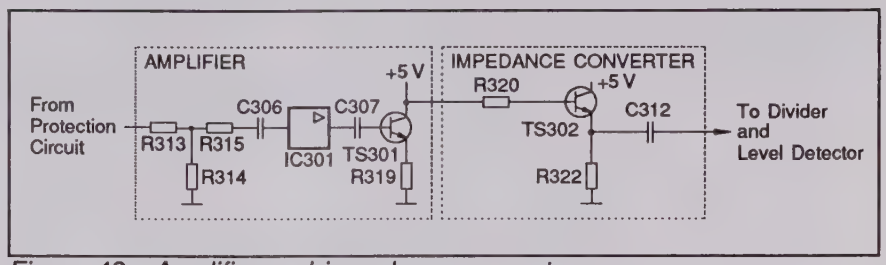

Figure 43. Amplifier and impedance converter.

An attenuator, R313...R315, reduces the signal level by 3 dB to avoid overloading of amplifier circuit IC301. The signal is amplified by about 15 dB by IC301 to compensate for the input attenuation.

TS301 amplifies by about 8 dB in the frequency range 0.9...1.3 GHz to expand the upper frequency margin for the divider circuit IC302 (after the Impedance Converter).

Impedance Converter

Transistor TS302 matches the high output impedance of the amplifier to the low input impedance of divider IC302.

Divider

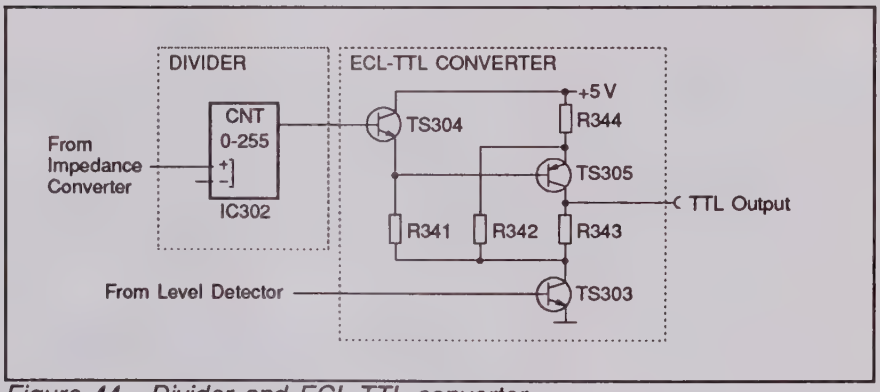

Figure 44. Divider and ECL-TTL converter.

IC302 divides the input frequency by 256, to max 5.5 MHz. This lower frequency is possible to measure by the measuring logic.

ECL-TTL Converter

The signal is converted from ECL to TTL level by the transistors TS304 and TS305 to match the measuring logic.

The conversion can be performed providing transistor TS303 is conducting. This transistor is used as an "acceptable level" switch and is controlled by a level detector.

Level Detector

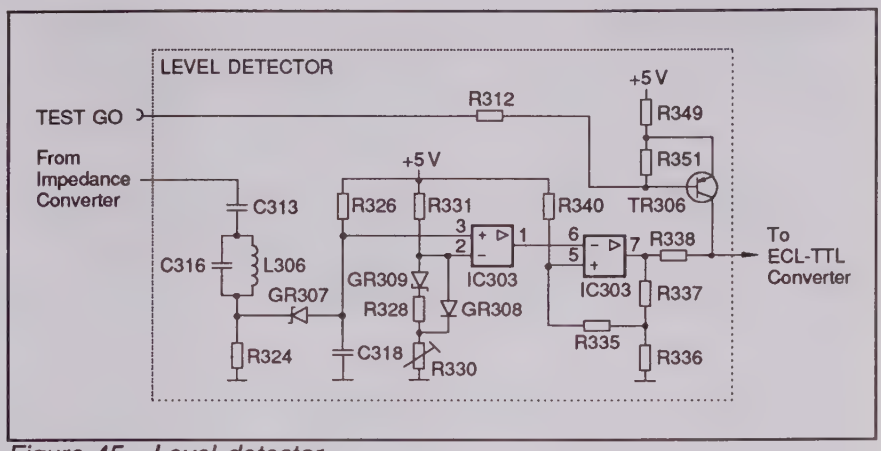

Figure 45. Level detector.

This circuit detects the lowest signal level which is acceptable for counting.

As a result of a sufficiently high input signal from the impedance converter, capacitor C318 is discharged via diode GR307, to a voltage level below the threshold level from potential divider R331/R328+R330. Pin 3 on IC303 becomes more negatively than pin 2 and the output of the amplifier, pin 1, becomes low. This amplifier stage amplifies the level by about 10 times.

The second amplifier stage, IC303, works as a Schmitt trigger. The output of this amplifier, pin 7, becomes high if the level on pin 6 sinks below the level on pin 5. Transistor TS303 in the ECL-TTL converter starts conducting.

R330 is used to set the threshold level for IC303, pin 2.

The temperature drift of the detector diode GR307 is compensated by the diodes GR308 and GR309.

For test purpose it is possible to force TS303 to conduct by connecting TEST GO (BU303 pin 5) to ground.

- ***MTCXO Oscillator***
  (option)

The PM 9607 MTCXO Oscillator cannot be repaired at a local workshop. It has to be sent to the factory for repair. Therefore only the principle is described here.

A crystal oscillator generates a frequency of 10 MHz, and a temperature oscillator generates a frequency proportional to the crystal temperature.

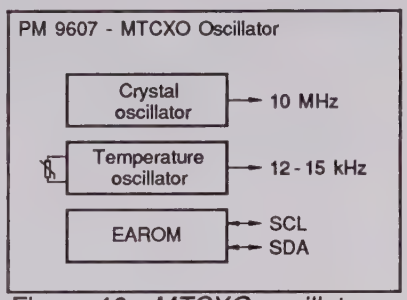

Figure 46. MTCXO oscillator.

The frequency deviations of the crystal oscillator for different temperatures are stored in an EAROM type memory.

The frequency of the temperature oscillator and the corresponding value from the EAROM is read by the Micro-Controller. This information is used to compensate the measuring result to a correct value with respect to the ambient temperature.

- ***GPIB Interface***
  (option)

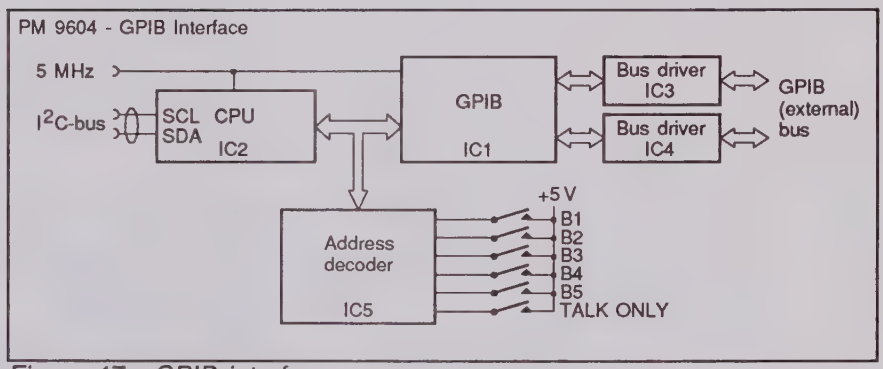

Figure 47. GPIB interface.

The PM 9604 GPIB Interface controls the communication between the internal microcontroller and the external GPIB bus.

IC2 controls the GPIB converter IC1 and works as a slave processor to the microcontroller IC105.

Address decoder IC5 reads the address switch settings into IC2.

Two bus drivers, IC3 and IC4, read and write information on the external bus.

If information is to be sent from the internal to the external bus, the main controller IC105 orders processor IC2 to address affected registers in IC1. IC2 reads the I^2C-bus and the information read is transferred to GPIB converter IC1 to be forwarded to the external bus via the I^2C-bus.

If IC1 receives information from the external bus it sends an interrupt to IC2 (pin 12). IC2 reads the information and requests attention to IC105 which fetches the information.

- ***Battery Unit***
  (option)

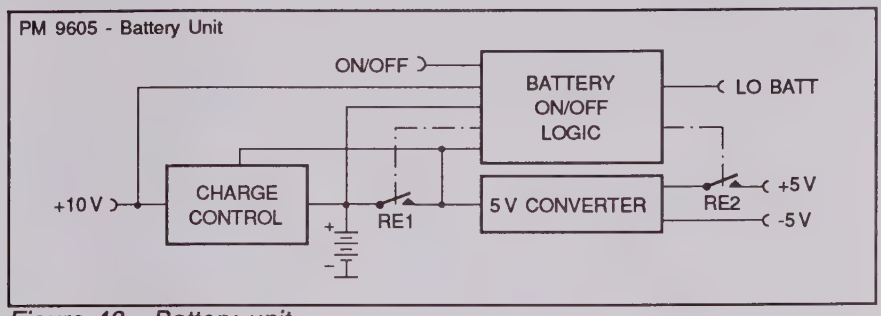

Figure 48. Battery unit.

The PM 9605 Battery Unit contains the following sub-functions (individually described below and on the next page):

CHARGE CONTROL	limits the charging current and controls the charging voltage to a maximum of 6.9 V.
5 V CONVERTER	generates and regulates the supply voltages for the counter.
BATTERY ON/OFF LOGIC	turns off the output power to protect the battery when its voltage has dropped to a certain level.

Charge Control

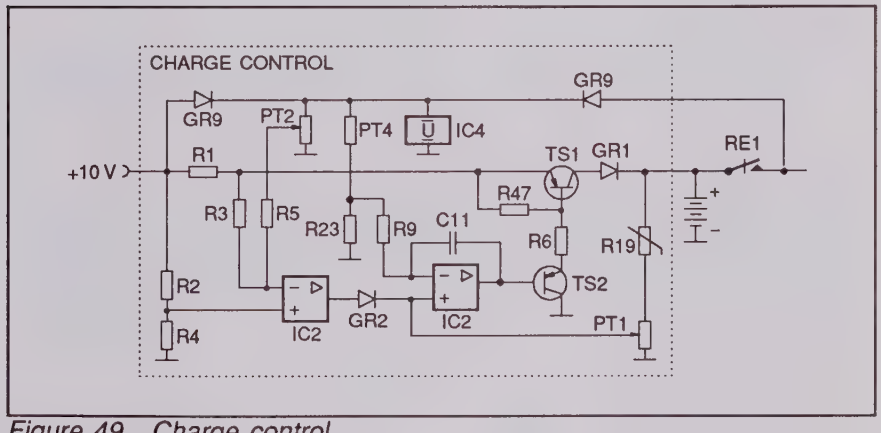

Figure 49. Charge control.

The charging current passes the Charge Control circuitry via R1, TS1, and GR1. This current causes a voltage drop across R1 which is sensed and used to regulate transistor TS1.

As a result of an increase in charging current, the voltage drop across R1 increases. This causes a higher potential difference between the sensing inputs to IC2 (via R2 and R3). The output level from this amplifier rises, as does the output level from the following amplifier as well. Transistor TS2 becomes less conducting. The base potential of TS1 rises and thus limits the charging current.

IC4 keeps a constant voltage to PT2 and PT4.
PT1 is used to set the maximum charging voltage.
PT2 is used to adjust the maximum charging current.
R19 is used for temperature compensation.

5 V Converter

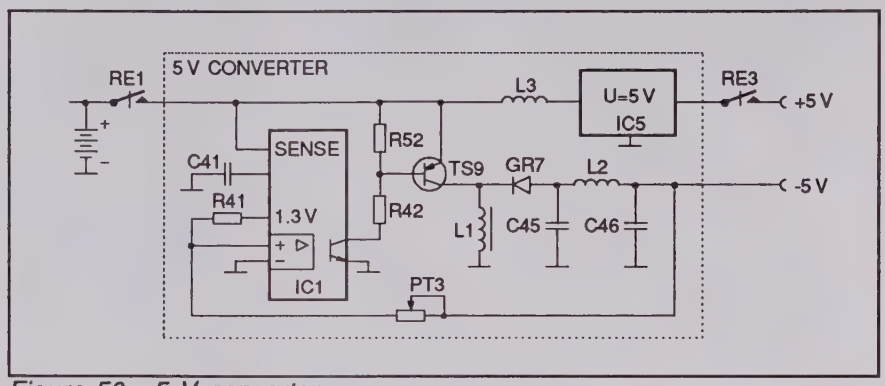

Figure 50. 5 V converter.

The 5 V converter generates -5 V and regulates +5 V and -5 V power to the counter. The input from the battery and the +5 V output is switched by the relays RE1 and RE2 controlled from the battery ON/OFF logic.

To obtain the -5 V supply, current from the battery is switched through transistor TS9. Integrated circuit IC1 generates the switching pulses for the transistor. The current pulses through TS9 cause a voltage to develop across L1. This voltage is rectified by GR7, then filtered and smoothed by C45, L2 and C46.

The output voltage is regulated to -5 V by being fed back to IC1 where it is summed with the internal reference voltage to regulate the switching pulses.

C41 sets the output frequency of IC1 to about 30 kHz.

PT3 is used to adjust the -5 V level.

Battery ON/OFF Logic

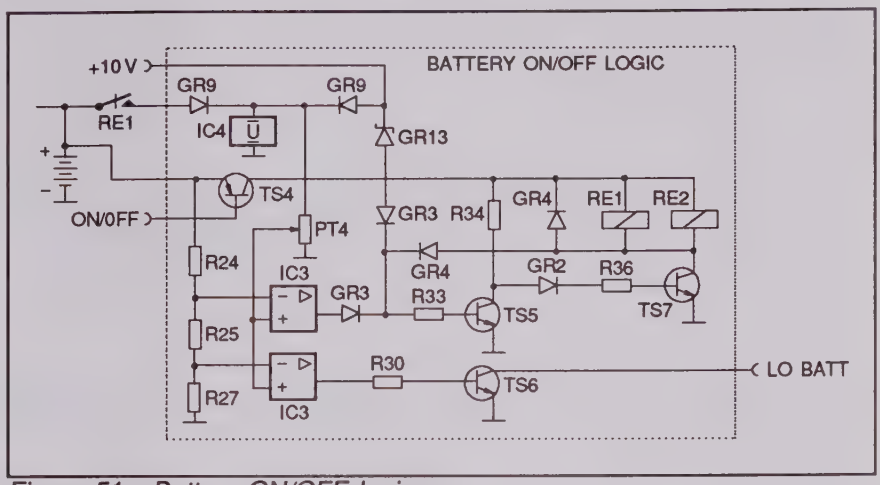

Figure 51. Battery ON/OFF logic.

The battery voltage is divided in two voltage levels by the resistors R24, R25 and R27. These two levels are individually compared to a reference voltage given from the constant voltage circuit IC4 and adjustable by PT4. The comparisons are performed by IC3 as follows:

If the battery voltage drops to the first limit, the level between R25 and R27 becomes low in comparison to the reference voltage. The output from IC3 becomes high and transistor TS6 conducts. LO BATT sends an interrupt to the Micro-Controller.

If the battery voltage drops to the second limit, below the first one, the level between R24 and R25 becomes low in the same way as above. Transistor TS5 conducts, which causes transistor TS7 cease conducting and the relays RE1 and RE2 to release.

To make sure that the battery is disconnected when the instrument is used from the mains, +10 V is fed to the base of transistor TS5 via the diodes GR13 and GR3. The transistor conducts and forces the relays to release. Because of this function, the counter must be switched on without the mains lead connected if it is to be used with battery power.

FUNCTION CHECK

Function check describes how to examine the counter to ascertain that all main functions are operational.

Preparations

Power up the instrument at least 30 minutes before checking to let it attain normal operating temperature.

Required test equipment, see page 7.

- Fit the BNC T-piece to input A, and the 50 ohm termination to the EXT REF input. Interconnect with a cable.
- Connect the HF generator to the T-piece. Set the frequency to 10 MHz ±0.1 MHz and the amplitude to 1.4 V_{p-p} (7 dBm).

Self Test

- Release all push buttons. The trigger level/sensitivity potentiometers should be in sensitivity position and set to 20 mV sensitivity (PM 6665).
- Test jumper JP101 on the basic board (see figure 52) must be in the NORM position.

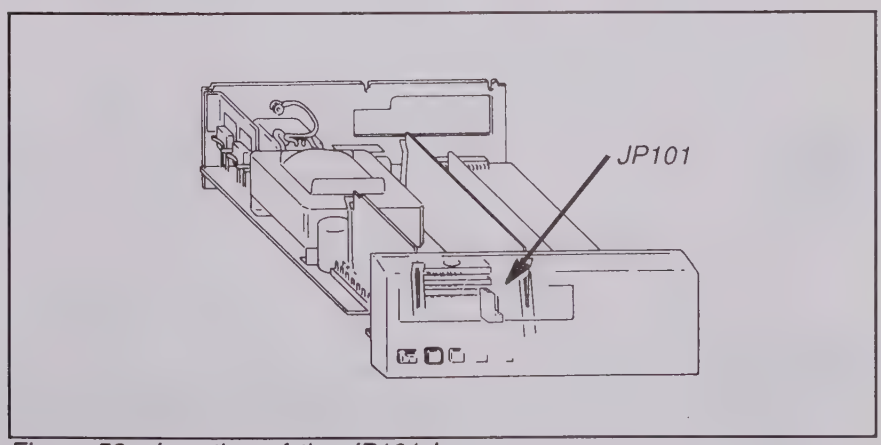

Figure 52. Location of the JP101 jumper.

- Switch on the counter. It now runs the following tests:

  Display test (display segments - for 6666 also keytop LEDs).
  RAM test
  Measuring logic test

  The following error codes can be displayed:

  Error 01 - RAM error
  Error 02 - Measuring logic error
  Error 03 - I^2C-bus error

  Error 03 may be displayed during normal use.
  Error OF means overflow and may also be displayed during normal use.

  No displayed code means that no error was found.

Measuring Time

- Run the counter with the measuring times below and read the display. The values read shall be as in the table below.

MEAS TIME	Display values	
0.2 s	10.00000	MHz ±1 in the last digit
1.0 s	10.000000	MHz ±1 in the last digit
10.0 s	10.0000000	MHz ±1 in the last digit
Single	10.000	MHz ±1 in the last digit

Display Hold

- Press the DISPL HOLD button. The instrument shall stop counting when the current measurement is completed. The DISPL HOLD indicator shall then appear.
- Press the DISPL HOLD button again. The DISPL HOLD indicator shall extinguish and the instrument shall count and display the values again.

RPM A

(PM 6665)

- Select RPM A.
- The instrument shall now count and display 600.000 M.

PERIOD A

- Select PER A.
- The instrument shall now count and display 100.0000 ns.

TOT A/B⎍

- Select TOT A/B⎍.
- Activate COM.
- The instrument shall now count and display 0.

TOT A/B⎍⎍

- Select TOT A/B⎍⎍.
- Select negative SLOPE B.
- The COMMON function shall still be activated.
- The instrument shall now count and display 1.

TOT A/MAN

- Switch off COM.
- Select positive SLOPE B.
- Select TOT A/MAN.
- Press TOTALIZE START/STOP once. The instrument shall now count.
- Press the button once again. The instrument shall now stop counting.
- Hold the button depressed for about 1 sec. The counter shall be reset and display zero.

Push Buttons

- Switch off the counter.
- Move jumper JP101 inside the counter to the TEST position.
- Switch on the counter.
- Press RESET/LOCAL on the front panel.
- Press the CALIB button inside the counter, see figure 53.

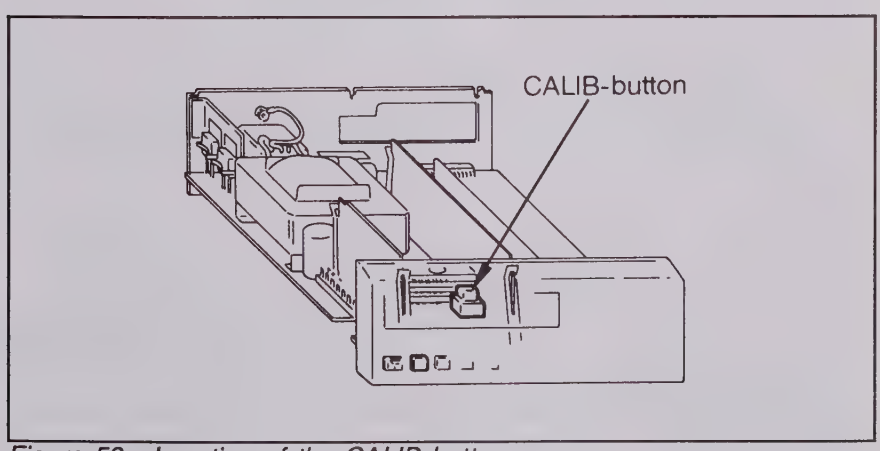

Figure 53. Location of the CALIB button.

- The displayed identity/option code shall be in accordance with the applicable code in the following table.

Code	Oscillator	GPIB	HF Input	6665	6666
8.4	Std.			X	
8.5	Std.		Included	X	
8.6	MTCXO			X	
8.7	MTCXO		Included	X	
9.4	Std.	Included		X	
9.5	Std.	Included	Included	X	
9.6	MTCXO	Included		X	
9.7	MTCXO	Included	Included	X	
8.	MTCXO		Included		X
8.-	MTCXO				X
8.8	Std.				X
8.9	Std.		Included		X
9.	MTCXO	Included	Included		X
9.-	MTCXO	Included			X
9.8	Std.	Included			X
9.9	Std.	Included	Included		X

- Press the buttons listed in the following table. The displayed codes shall be in accordance with the codes in the following button code table.

Button	Code	6665	6666
RESET	2.0	X	X
MEASURING TIME	2.1	X	X
FUNCTIONS	2.2	X	X
DISPLAY HOLD	3.0	X	X
BLANK DIGITS*	3.1	X	
COMMON via A	3.1		X
ATTENUATOR A	4.2		X
SLOPE A	2.5		X
AC/DC A	4.4		X
AC/DC B	4.5		X
SLOPE B	3.5		X
ATTENUATOR B	4.3		X
SET A	3.3		X
AUTO LEVEL	2.3		X
READ LEVEL	2.4		X
SET B	3.4		X

* Early PM 6665 Timer/Counters do not have this button.

- Turn off the counter.
- Move jumper JP101 to the NORM position.

PERFORMANCE CHECK

Performance check describes the measuring methods and data necessary to verify correct signal values and voltage levels in the counter. After completed "Performance Check" the counter will meet the specifications published in the Operators' Manual.

Preparations

Power up the instrument at least 30 minutes before checking to let it attain normal operating temperature.

Required test equipment, see page 7.

Oscillator

To check the accuracy of the oscillator, use a reference with an accuracy of at least $3 \cdot 10^{-8}$. The PM 9691 oven-enclosed oscillator used in Philips counters version /.5. meet this requirement, if calibrated.

• *Uncompensated Crystal Oscillator*

- Connect the external 10 MHz reference to input A.
- Select measuring time 1.0 s.
- The counter should display 10 MHz ±150 Hz. This is the maximum deviation after one year of ageing (±50 Hz) plus the maximum deviation due to temperature (±100 Hz).

• *MTCXO Oscillator (option)*

- Connect the external 10 MHz reference to input A.
- Select measuring time 1.0 s.
- The counter should display 10 MHz ±7 Hz. This is the maximum deviation after one year of ageing (±5 Hz) plus the maximum deviation due to temperature (±2 Hz).

Input A and B

Where the procedures for input A and input B are similar, only input A is described.

• Sensitivity and Frequency Range

- Connect the HF generator (via an attenuator if required) to the BNC T-piece. Connect the T-piece to input A, see figure 63.
- Interconnect the T-piece with the 350 MHz oscilloscope. Use as short cable as possible.
- Select measuring time 0.2 s.
- Select function FREQ A.
- Read the amplitude on the oscilloscope.
- The instrument shall count correctly with the following sine wave input signals:

PM 6665:		PM 6666:	
Frequency	**Sine wave**	**Frequency**	**Sine wave**
1 MHz	56 mV_{p-p} (-21 dBm)	1 MHz	56 mV_{p-p} (-21 dBm)
50 MHz	56 mV_{p-p} (-21 dBm)	30 MHz	56 mV_{p-p} (-21 dBm)
100 MHz	56 mV_{p-p} (-21 dBm)	80 MHz	113 mV_{p-p} (-15 dBm)
120 MHz	85 mV_{p-p} (-17 dBm)	120 MHz	113 mV_{p-p} (-15 dBm)

• Filter *(PM 6665)*

- Connect the LF synthesizer to input A.
- Pull the SENSITIVITY knob.
- Set the synthesizer frequency to 1 MHz sine wave and the amplitude to 56 mV_{p-p} (-19 dBm).
- Adjust the SENSITIVITY potentiometer to the position where the counter just starts to count.
- Press the FILTER button.
- Increase the input signal 100 times (40 dB).
- The counter shall not count the signal when the filter is on.

• Common via A

- Select RATIO A/B.
- Switch on COM.
- Connect the HF generator to input A.
- Set the generator frequency to 12 MHz and the signal amplitude to 70 mV_{p-p} (-19 dBm).
- The counter shall display 1.00000, ±1; the last digit and the trigger indicator for input B shall be visible.
- Turn off COM.

• Sensitivity and Frequency Range in RATIO A/B

- Select RATIO A/B.
- Connect the HF generator via the BNC T-piece to input A, see figure 54.
- Connect the T-piece via a 50 ohm termination to input B.

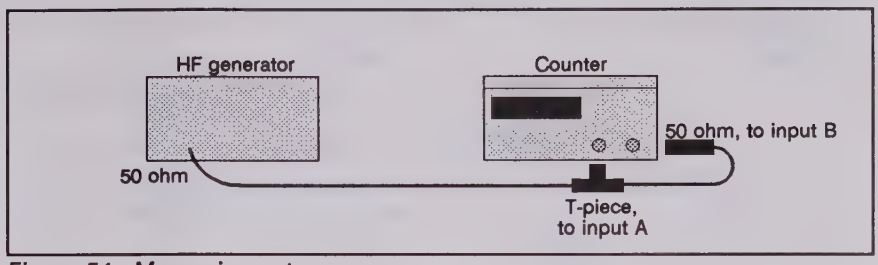

Figure 54. Measuring setup.

- Set the generator frequency to 12 MHz, sine wave, and the amplitude to 56 mV_{p-p} (-21 dBm).
- The instrument shall now count and display 1.00000, ±1 in the last digit.

• ***Sensitivity Potentiometer Range (PM 6665)***

- Use the measuring setup described in the section above (see figure 54).
- Set the frequency to 1.3 MHz, sine wave, and the amplitude to 280 mV_{p-p} (-7 dBm).
- Press the FILTER button.
- Turn the SENSITIVITY A potentiometer slowly counter clockwise. The instrument may lose the signal and begin to miscount in the first third of the scale. It shall work properly in the second two thirds.

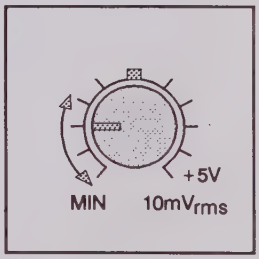

Figure 55.

- Turn the potentiometer to the right-hand end position (fully clockwise).
- Repeat the procedure for the SENSITIVITY B potentiometer.

• ***Trigger Level (PM 6665)***

- Use the measuring setup described in the section above (see figure 54).
- Set the generator frequency to 1.3 MHz sine wave, 8 V_{p-p} (22 dBm).
- Select trigger state by pushing the both trigger potentiometers.
- Press the FILTER button.
- The instrument shall count between +3.5 V and -3.5 V on the potentiometer scale, but not between +3.5 V and +5 V, nor between -3.5 V and -5 V.

• ***Trigger Level (PM 6666)***

- Connect the adjustable power supply and the multimeter to input A using the BNC banana adapter.
- Set the DC voltage to 4.00 V.
- Select DC, AUTO LEVEL, READ LEVEL and COMMON.
- The counter shall display "4.00 4.00".
- Move the DC voltage source to input B.
- Turn off COMMON.
- The counter shall display "0.00 4.00".

• *Voltage Measurement (PM 6666)*

-Disconnect all signal sources from both inputs.

- Press RESET and select VOLT A.
- Connect the LF synthesizer to input A.
- Set the synthesizer to sine wave with an amplitude of 9.8 V_{p-p}.
- The counter shall display 4.9 V ±0.2 V and -4.9 V ±0.2 V at following frequencies: 1 kHz, 10 kHz, 500 kHz, and 2 MHz.

• *Single Time Interval A-B (PM 6665)*

- Connect the pulse generator to input A and input B as shown in figure 54 on page 45.
- Set the generator signal repetition time to 1 µs and the amplitude to 2 V_{p-p} (10 dBm).
- Set the rise- and fall time to min.
- Select TIME A-B and negative SLOPE B.
- Select SINGLE measuring time. Position the trigger level potentiometers as shown in figure 56.
- Adjust the duration time from the pulse generator to give a value of 0.1 µs on the counter display.
- Select positive SLOPE B and negative SLOPE A
- The counter shall display 0.9 µs, ±1 in the last digit.
- Select positive SLOPE A.

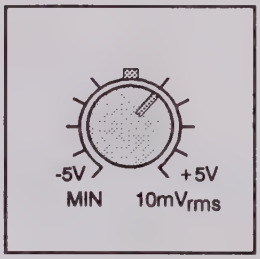

Figure 56.

• *Single Time Interval A-B (PM 6666)*

- Connect the pulse generator to input A and input B as shown in figure 54 on page 45.
- Set the generator signal repetition time to 1 µs and the amplitude to 2 V_{p-p} (10 dBm).
- Set the rise- and fall time to min.
- Select TIME A-B and negative SLOPE B.
- Select SINGLE measuring time.
- Set TRIGGER LEVEL to 1.00 V for both inputs.
- Adjust the duration time from the pulse generator to give a value of 0.1 µs on the counter display.
- Select negative SLOPE A and positive SLOPE B.
- The counter shall display 0.9 µs, ±1 in the last digit.

• *Average Time Interval A-B*

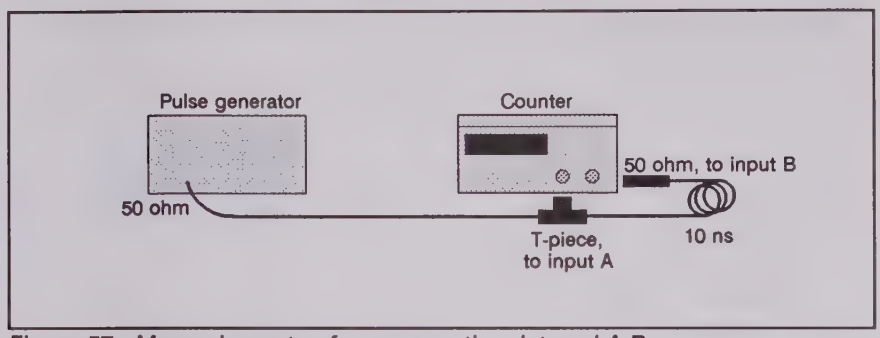

Figure 57. Measuring setup for average time interval A-B.

- Connect the Pulse Generator via the T-piece to input A.
- Connect the T-piece via a 50 ohm termination and a 10 ns coaxial cable to input B.
- Set the pulse repetition time to 50 μs.
- Set the signal amplitude to 2 V_{p-p}.
- Set the pulse duration to 250 ns.
- Set the rise- and fall time to min.
- Select positive SLOPE A and SLOPE B.
- Select 0.2 s measuring time.

PM 6665:

- Select TIME A-B.
- Pull the TRIGGER LEVEL A and TRIGGER LEVEL B controls, and turn them fully clockwise.
- The counter shall display 10 ns ±4 ns.
- Select negative SLOPE A and SLOPE B. The counter readout shall not change by more than 2 ns.
- Select positive SLOPE A and SLOPE B.

PM 6666:

- Select AC on both inputs.
- Set SENSITIVITY to 0.02 V on both inputs.
- The counter shall display 10 ns ±4 ns.
- Select negative SLOPE A and SLOPE B. The counter readout shall not change by more than 2 ns.
- Select positive SLOPE A and SLOPE B.

- ***EXT REF Sensitivity***

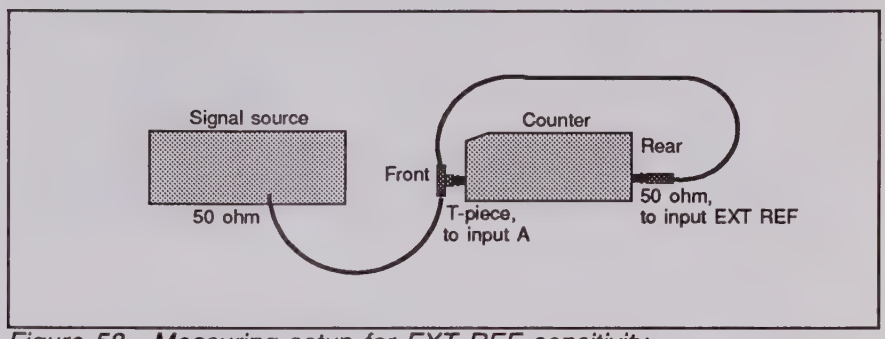

Figure 58. Measuring setup for EXT REF sensitivity.

- Disconnect all signal sources from both inputs.
- Select positive SLOPE A and SLOPE B.
- Select FREQ A.
- Fit a BNC T-piece to input A, and a 50 ohm termination to the EXT REF input.
- Connect a cable to the T-piece, and feed in a 10 MHz ±0.1 MHz, 1.4 V_{p-p} (7 dBm) sine wave signal.
- Make sure that the EXT REF and TRIGGER A indicators are visible.
- The instrument shall now count and display 10 MHz.

HF Input
(option)

Let the HF Input be in use in at least 10 minutes before checking it.

Required test equipment, see page 7.

- ***Sensitivity***

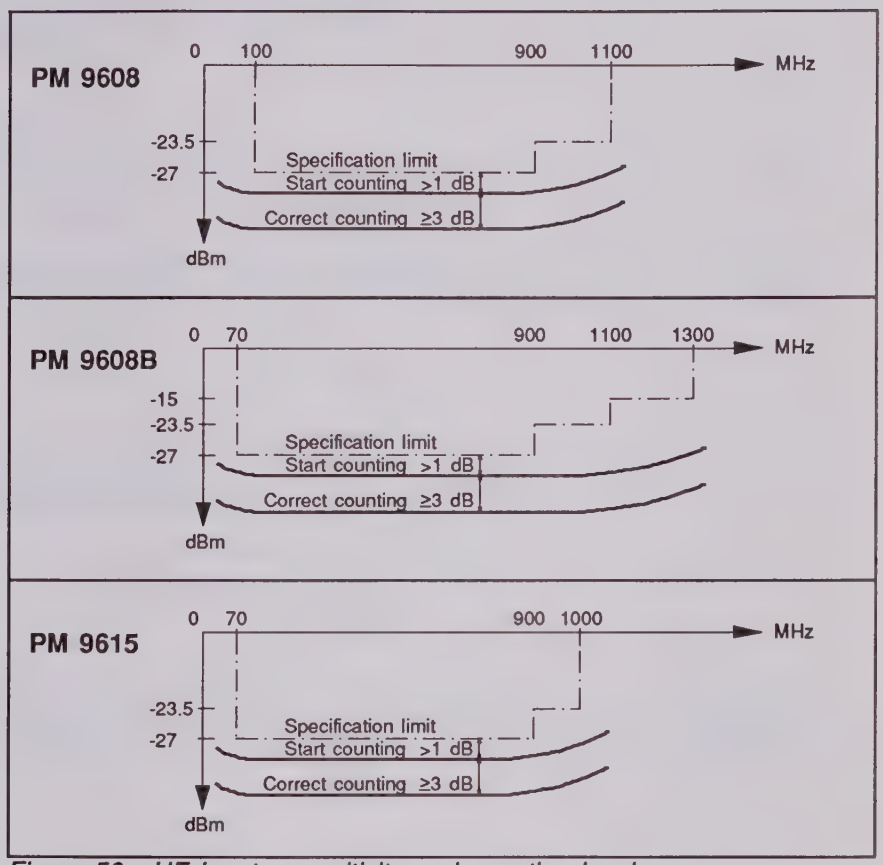

Figure 59. HF Input - sensitivity and counting levels.

- Connect the sweep generator to the HF input.
- Set the generator signal to the following frequency:

  type PM 9608 100 MHz
  PM 9608B 70 MHz
  PM 9615 70 MHz

- Decrease the amplitude from the generator until the instrument stops counting.
- Increase the amplitude slowly until the instrument starts counting again. Read the value.

  NOTE: Compensate for the losses in the coaxial cable when reading the value (about 1 dB/m for RG/M58).

- The "start counting" level shall be more than 1 dB below the specified limit shown in figure 59.
- Repeat this procedure with the following frequencies:

  type PM 9608 200, 300, ... up to 1100 MHz
  PM 9608B 100, 200, ... up to 1300 MHz
  PM 9615 100, 200, ... up to 1000 MHz

GPIB Interface
(option)

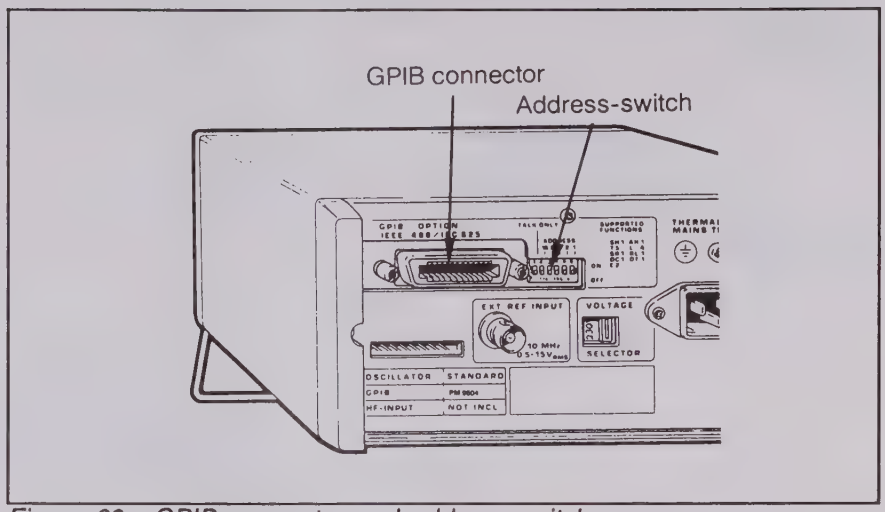

Figure 60. GPIB connector and address switch.

The test is intended for an HP-85 controller.

- Make sure that the TALK ONLY switch (the leftmost switch in the address switch block) is set to "0".
- Address the counter and execute the following sequence.

Type on the controller	This should happen
REMOTE 710	The remote indicator should be switched on.
OUTPUT 710;"ID?"	Ask for the counter identity.
ENTER 710;A$	Input result from the counter.
DISP A$	The response on the display of the controller is the identity of the counter.

The counter will, if everything is correct, identify itself as:

PM6665(6666)/YZW/MN

where Y = 4 if the counter has an HF Input, otherwise 0.
Z = 3 for MTCXO, otherwise 1.
W = 6 (GPIB-bus is installed).
M = Revision No. of counter firmware.
N = Revision No. of GPIB-bus firmware.

Battery Unit
(option)

Check the capacity of the battery in the following way:

- Charge the battery during a period of 24 hours.
- Make sure that the capacity of the battery is sufficient to drive the counter for 2.5 hours (PM 6665) or 2 hours (PM 6666).

ADJUSTMENTS

This chapter describes adjustment procedures which may need to be performed occasionally, and which must be performed after repair.

Component designations printed on the PC board in the counter are written within parenthesis following the component numbers in the descriptions of this chapter.

Preparations

Power up the instrument at least 30 minutes before checking to let it attain normal operating temperature.

Required test equipment, see page 7.

Oscillator

To check the accuracy of the oscillator, use a reference with an accuracy of at least $3 \cdot 10^{-8}$. The PM 9691 oven-enclosed oscillator used in Philips counters version /.5. meet this requirement, if calibrated.

• Uncompensated Crystal Oscillator

- Connect the external 10 MHz reference to input A.
- Set the oscillator frequency to 10 MHz ±10 Hz by adjusting the trimmer capacitor C403 from the solder side of the oscillator board. Use the screwdriver specified in *"Required test equipment"*, page 7.

• MTCXO Oscillator *(option)*

The MTCXO must have a reasonably stable temperature when being calibrated. **Follow the instructions carefully.**

If you remove the cover when the counter has been switched on, the temperature of the MTCXO will drop rapidly by about 10°C. Since the MTCXO must have a stable temperature when being calibrated, you must not calibrate until one hour after removing the cover.

If the counter has been switched off for more than three hours, you can calibrate it directly.

- Connect the external 10 MHz reference to input A.
- Select measuring time 1 s.
- The instrument shall display 10 MHz ±2 Hz

- Depress the RESET/LOCAL button on the front panel while holding down the "CALIB" (calibration) button SK103 on the basic board inside the instrument.
- The counter selects FREQ A and measuring time 10 s.
- During the first measuring period, the difference between the old and the new value will be displayed.
- The MTCXO calibration is completed when the counter displays 10 MHz ±0.1 Hz after several measuring periods of 10 s length.

Input A and B

Where the procedures for input A and input B are similar, only input A is described.

• *DC Offset and Sensitivity (PM 6665)*

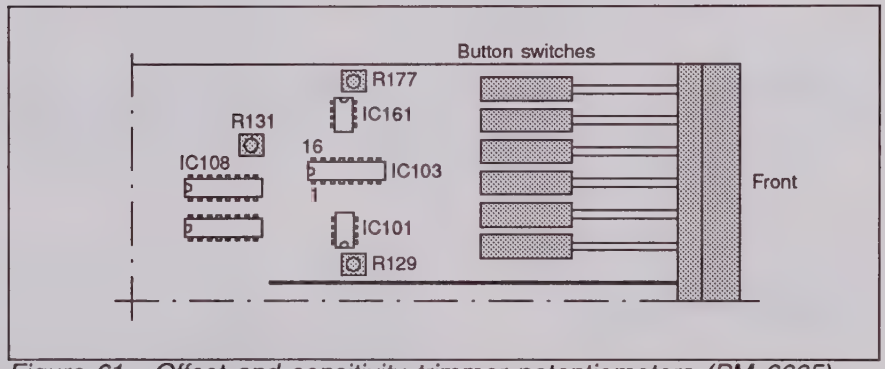

Figure 61. Offset and sensitivity trimmer potentiometers (PM 6665).

- Connect the LF synthesizer to input A.
- Set the synthesizer to a sine wave signal with a frequency of 1 kHz and an amplitude of 200 mV_{p-p} (-10 dBm).
- Select AC on both inputs.
- Connect the probe of the oscilloscope to IC103 pin 1, see figure 61.
- Adjust potentiometer R129 (OFFSET) to make the signal symmetrical.
- Change the amplitude to 30 mV_{p-p} (-26 dBm) and adjust R131 to the point where the instrument just starts counting.
- Move the signal source to input B and change the amplitude to 50 mV_{p-p} (-22 dBm).
- Move the probe to IC103 pin 16.
- Adjust potentiometer R177 (OFFSET) to make the signal symmetrical.

- *DC Offset and Sensitivity*
  (PM 6666)

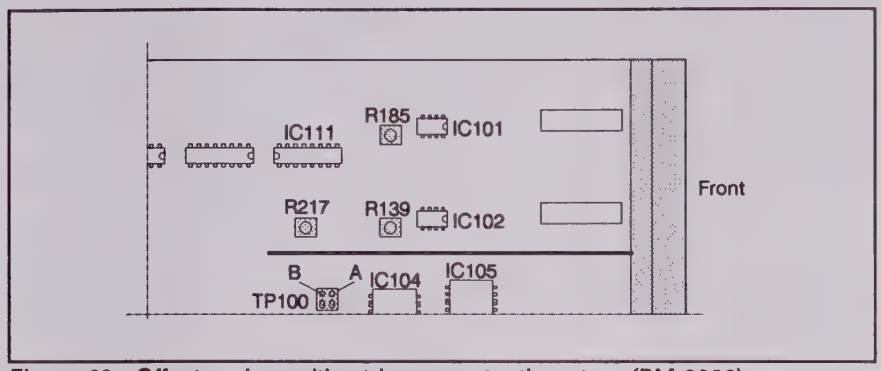

Figure 62. Offset and sensitive trimmer potentiometers (PM 6666).

- Connect the LF synthesizer to input A.
- Set the synthesizer to a sine wave signal with a frequency of 6 kHz and an amplitude of 50 mV_{p-p} (-22 dBm).
- Deselect AUTO LEVEL.
- Select AC on both inputs.
- Connect the probe of the oscilloscope to TP100 pin A, see figure 62.
- Adjust potentiometer R139 (OFFSET) to make the signal symmetrical.
- Change the amplitude to 30 mV_{p-p} (-26 dBm) and adjust R217 (SENS) to the point where the instrument just starts counting.
- Move the signal source to input B and change the amplitude to 50 mV_{p-p} (-22 dBm).
- Move the probe to TP100 pin B.
- Adjust potentiometer R185 (OFFSET) to make the signal symmetrical.

- *Frequency Compensation*
  (PM 6665)

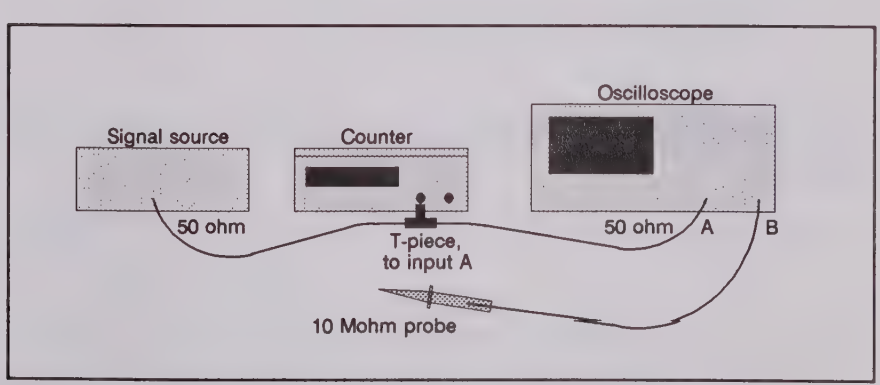

Figure 63. Measuring setup for frequency compensation.

- Connect the pulse generator and the oscilloscope as shown in figure 63.
- Set the signal from the pulse generator to input A to a frequency of 6 kHz square wave and an amplitude of 1.5 V_{p-p}.
- Select ATT X 1 and DC on both inputs.
- Set channel A of the oscilloscope to 200 mV/div., channel B to 10 mV/div. and the sweep to 10 μs/div.

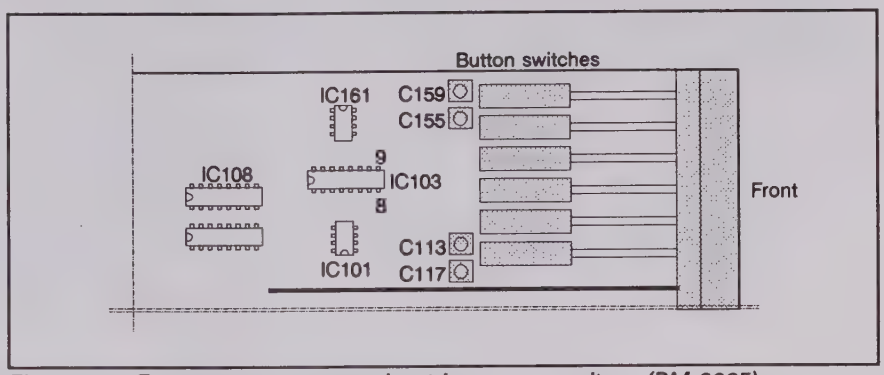

Figure 64. Frequency compensation trimmer capacitors (PM 6665).

- Connect the probe to IC103 pin 7, see figure 64.
- Adjust capacitor C113 (1/1) to get the signals to look the same.
- Move the input signal source to input B.
- Move the probe to IC103 pin 10.
- Adjust capacitor C155 (1/1) to get the signals to look the same.
- Select ATT X 10 on both inputs.
- Increase the input signal to 10 V_{p-p}.
- Set channel A of the oscilloscope to 2 V/div., channel B to 10 mV/div. and the sweep to 10 μs/div.
- Connect the probe to IC103 pin 10.
- Adjust capacitor C159 (1/10) to get the signals to look the same.
- Move the input signal source to input A.
- Move the probe to IC103 pin 7.
- Adjust capacitor C117 (1/10) to get the signals to look the same.

• *Frequency Compensation (PM 6666)*

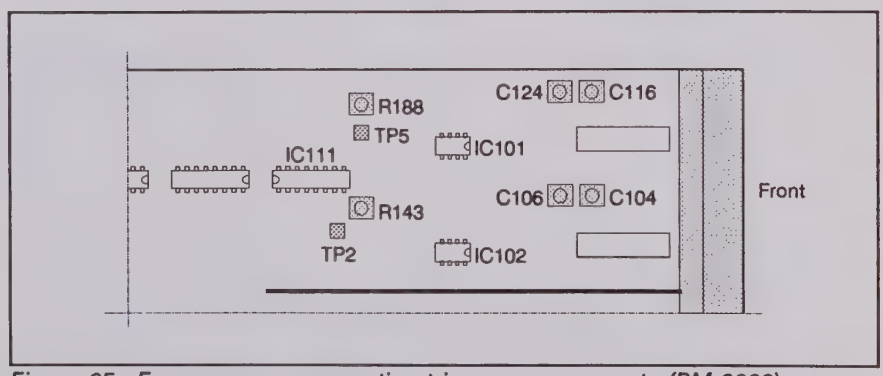

Figure 65. Frequency compensation trimmer components (PM 6666).

- Connect the pulse generator and the oscilloscope as shown in figure 63 on page 53.
- Set the signal from the pulse generator to input A to a frequency of 6 kHz square wave and an amplitude of 1.5 V_{p-p}.
- Select ATT X 1 and DC on both inputs.

- Set channel A of the oscilloscope to 200 mV/div., channel B to 10 mV/div. and the sweep to 50 μs/div.
- Connect the probe to TP2, see figure 65.
- Adjust capacitor C106 (1/1) and potentiometer R143 (LINJ) alternately to get the signals to look the same.
- Move the input signal source to input B.
- Move the probe to TP5.
- Adjust capacitor C124 (1/1) and potentiometer R188 (LINJ) alternately to get the signals to look the same.
- Select ATT X 10 on both inputs.
- Increase the input signal to 10 V_{p-p}.
- Set channel A of the oscilloscope to 2 V/div., channel B to 10 mV/div. and the sweep to 50 μs/div.
- Adjust capacitor C116 (1/10) to get the signals to look the same.
- Move the input signal source to input A.
- Move the probe to TP2.
- Adjust capacitor C104 (1/10) to get the signals to look the same.

• *Trigger Level*
(PM 6666)

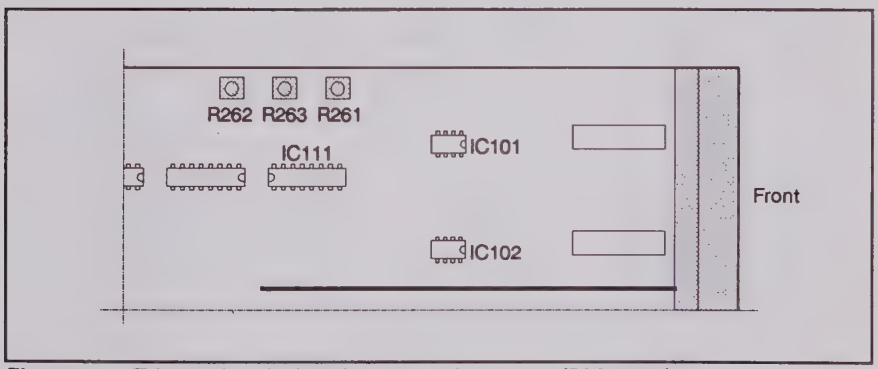

Figure 66. Trigger level trimming potentiometers (PM 6666).

- Connect the adjustable power supply and the multimeter to input A using the BNC banana adapter.
- Set the DC voltage to 4.00 V.
- Select DC, AUTO LEVEL, READ LEVEL and COMMON.
- Adjust the potentiometers R261 (TRL A) and R263 (TRL COMMON) to get the counter to display "4.00 4.00".
- Move the DC voltage source to input B.
- Press COMMON.
- Adjust potentiometer R262 (TRL B) to get the counter to display "0.00 4.00".

HF Input
(option)

Allow the HF Input to make a measurement for at least 10 minutes before adjusting it.

Required test equipment, see page 7.

- Connect the sweep generator to the HF input.
- Set the frequency to 900 ±25 MHz.
- Set the amplitude to 7.5 ±0.5 mV_{rms} (-29.5 ±0.5 dBm).
- Turn potentiometer R330 fully clockwise. The GATE indicator stops blinking. Turn R330 slowly counterclockwise until the GATE indicator starts blinking again. The input frequency shall now be displayed.

Battery Unit (option)

The battery unit must be installed in a counter during testing.

Required test equipment, see page 7.

• Charging Voltage

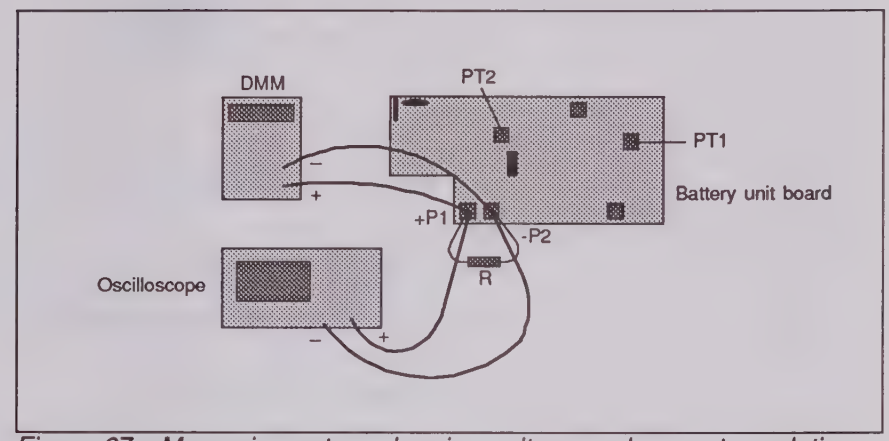

Figure 67. Measuring setup; charging voltage and current regulation.

- Disconnect the battery from the battery unit.
- Connect the 100 ohm/0.5 W resistor between P1 and P2. The resistor is shown as "R" in figure 67.
- Connect the DMM and the oscilloscope to P1 and P2.
- Switch on the counter.
- Adjust the charging voltage with PT1 in accordance with the ambient temperature table.
- The ripple shall not exceed 20 mV_{p-p}.
- Turn off the counter and remove the resistor.
- Reconnect the battery.

Ambient temperature		Voltage
18-20°C	64-68°F	6.91 V*
21-23°C	69-74°F	6.86 V*
24-26°C	75-79°F	6.81 V*

*Tolerance: +0.02 V, -0.05 V

• Current Regulation

- Disconnect the battery.
- Connect the 1 ohm/0.5 W resistor between P1 and P2. The resistor is shown as "R" in figure 67 above.
- Connect the DMM and the oscilloscope to P1 and P2 as shown in the same figure.
- Switch on the counter.
- Read the DMM while adjusting PT2 to get 500 mV ±20 mV.
- The ripple shall not exceed 40 mV_{p-p}.
- Turn off the counter and remove the resistor.
- Reconnect the battery.

- *-5 V Regulation*

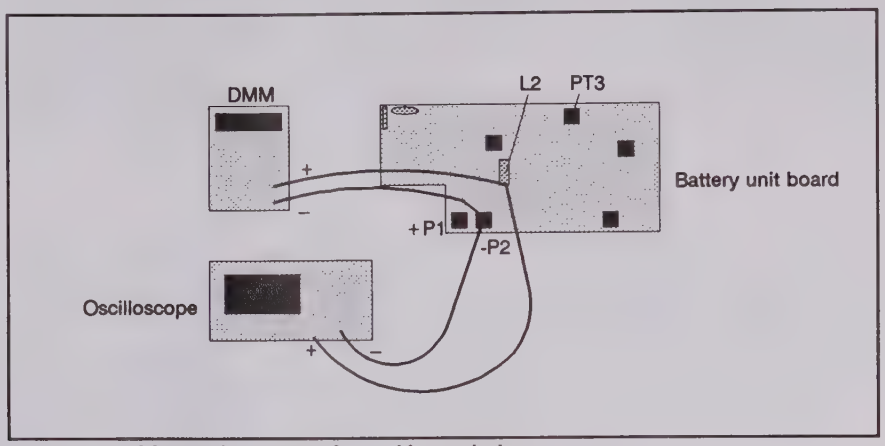

Figure 68. Measuring setup for -5 V regulation.

- Disconnect the battery from the battery unit.
- Connect the DMM and the oscilloscope between -5 V (L2 in figure 68) and ground (P2).
- Switch on the counter.
- Read the DMM while adjusting PT3 to get -5 V ±0.1 V.
- The ripple shall not exceed 60 mV_{p-p}.
- Reconnect the battery.

- *Low Battery Sensing*

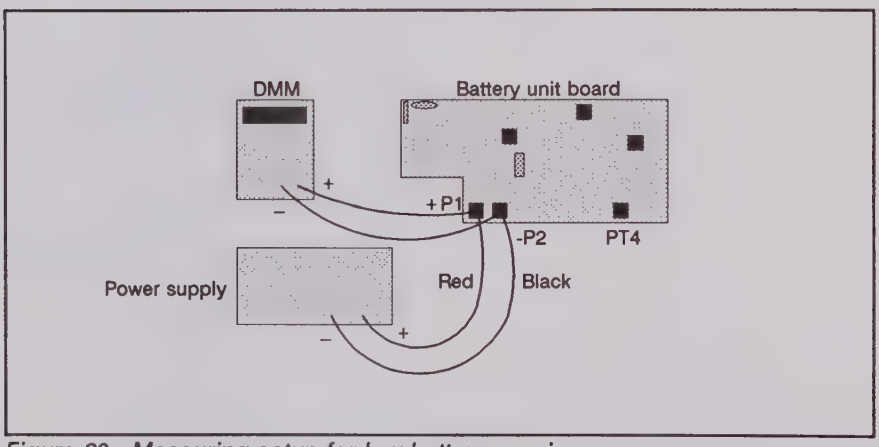

Figure 69. Measuring setup for low battery sensing.

- Disconnect the battery from the battery unit.
- Connect the DMM to P1 and P2.
- Connect the power supply between P1 and P2.
- Set the voltage from the power supply to 5.3 V ±0.05 V
- Turn PT4 fully counter clockwise.
- Turn PT4 slowly clockwise until the display starts blinking.
- Reconnect the battery.

REPAIR

Read the following *"Safety Inspection after Repair"* before commencing any repair on the unit.

Power up the instrument at least 30 minutes before measuring to let it attain normal working temperature.

Required measuring equipment, see page 7.

Safety Inspection after Repair

Make sure that creeping distances and clearances have not been reduced.

The condition and correct connection of the protective earth must be checked by visual inspection and by measuring the resistance between the protective lead at the plug and the cabinet. The resistance must not be more than 0.5 ohm. Move the power cord during the measurement. Resistance variations indicate a defect.

Logic Levels

The PM 6665 and PM 6666 counters contain logic of four families. The levels for these families are listed in the following table.

	LOGIC FAMILY			
	ECL positive	ECL negative	CMOS	TTL
Supply voltage	+5	-5	+5	+5
designation	V_{CC}	V_{EE}	V_{DD}	V_{CC}
Signal ground	0	0	0	0
designation	V_{EE}	V_{CC}	V_{SS}	GND
Input voltage				
High, V_{IH}	>+3.9	>-1.1	>+4	>+2
Low, V_{IL}	<+3.5	<-1.5	<+1	<+0.8
Output voltage				
High, V_{OH}	>+4	>-1	>+4.9	>+2.7
Low, V_{OL}	<+3.3	<-1.7	<+0.05	<+0.4
Bias ref. voltage, V_{BB}	+3.7	-1.3	-	-

All values in volt.

Fault-Finding

This fault-finding guide is intended to be used as follows:

Read the *"General"* section, which contains information on the built-in-test program.

Use the following fault-finding tree to find the source of the fault. This tree takes you, if appropriate, to the sections *"Extended Test Program"*, *"Counting Fault"*, and *"Faulty Push Button"*.

The three last sections of this chapter, *"HF Input"*, *"MTCXO Oscillator"*, and *"Battery Unit"* contain instructions for these option circuits not included in the fault-finding tree.

• General

When the instrument is switched on, it automatically runs an initial test program. This program contains display-, RAM-, and measuring logic tests. After completing these tests the instrument automatically enters the operational mode.

If the test jumper is moved from the NORM to the TEST position, the instrument starts an extended test program when the power is switched on. This test is described under *"Extended Test Program"*.

If the CALIB button on the basic board is pressed in test mode (with the jumper in the TEST position), a test sub-program is started. This program performs a test of the display circuitry, and, in the PM 6666, also the LED circuitry. The program then displays identity/option code and activated button code. The tables of these codes are given on page 42 under *"Push Buttons"*.

• Fault-Finding Tree

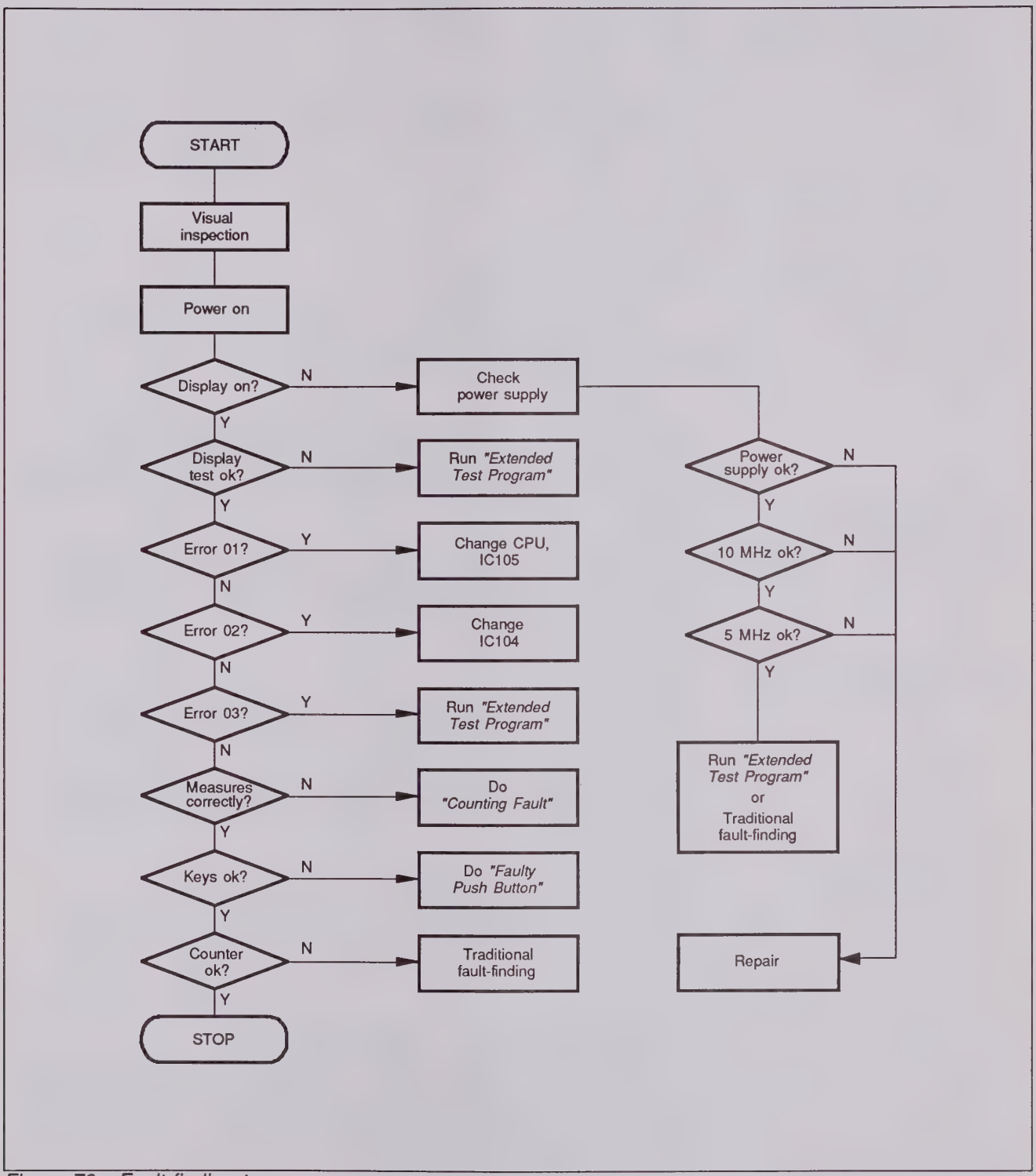

Figure 70. Fault-finding tree.

- ***Extended Test Program***
  (PM 6665)

To understand this description, you must understand the function of the I^2C-bus. This is described under *"Micro-Controller and I^2C-bus"* in the chapter on *"Functional Description"*.

With the aid of an oscilloscope, all the test signals can be examined and followed through the circuitry. Oscilloscope settings, see below.

- Switch off the counter.
- Move the test jumper on the basic board to the TEST position.
- Switch on the counter. The display shall remain blank.

As the jumper was in the TEST position when the counter was switched on, the built-in *"Extended Test Program"* controls the processor of the counter. This program contains instructions which order the processor to generate and send test signals via its own out-ports, and also sequences of test signals on the I^2C-bus.

Slaves connected to the I^2C-bus and addressed by the test signals shall acknowledge the addressing. Notice that the MTCXO oscillator and the GPIB interface are options and thus will acknowledge the addressing only if they are installed.

The test-signal pattern, shown in figure 71, has a repetition time of about 1.2 ms.

"Pin" in the same figure gives the pin numbers of the processor.

The levels of port 2.2 and port 2.1 are fixed during the cycle periods of 1.2 ms. Between these periods they change their levels in binary up-counting sequences:

00 01 10 11 00 ..... and so on

Port 2.1 is changed between every period. Port 2.2 is changed between every other period.

Measuring setup for the oscilloscope:

- Set negative trig slope on port 2.0 (the best measuring port) or SDA.
- Set MTB to 0.1 ms/div. Use the variable control to stabilize the trace.
- Set DTB to 20 µs/div to monitor the I^2C-bus.

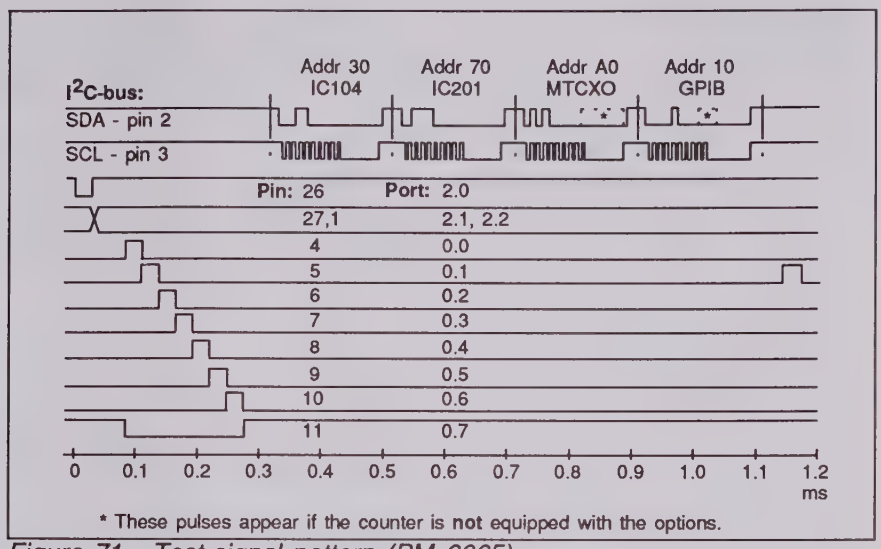

Figure 71. Test-signal pattern (PM 6665).

Signal sequence:

Port	2.0	30 µs negative pulse
Port	2.1 and 2.2	binary up-counting
Port	0.0	30 µs positive pulse - port 0.7 goes low
Port	0.1	30 µs positive pulse
Port	0.2	30 µs positive pulse
Port	0.3	30 µs positive pulse
Port	0.4	30 µs positive pulse
Port	0.5	30 µs positive pulse
Port	0.6	30 µs positive pulse - port 0.7 goes high
I^2C-bus	address 30H	IC104
I^2C-bus	address 70H	display driver IC201
I^2C-bus	address A0H	MTCXO oscillator
I^2C-bus	address 10H	GPIB interface
Port	0.1	30 µs positive pulse

- ***Extended Test Program***
  (PM 6666)

To understand this description, you must understand the function of the I^2C-bus. This is described under *"Micro-Controller and I^2C-bus"* in the chapter on *"Functional Description"*.

With the aid of an oscilloscope, all the test signals can be examined and followed through the circuitry. Oscilloscope settings, see page 67.

- Switch off the counter.
- Move the test jumper on the basic board to the TEST position.
- Switch on the counter. The display shall remain blank.

The relays of the counter are now affected by test pulses, which causes the counter to buzz. If the sound is disturbing, turn it off by moving the test jumper on the basic board back to the NORM position.

As the jumper was in the TEST position when the counter was switched on, the built-in *"Extended Test Program"* controls the processor of the counter. This program contains instructions which order the processor to generate and send test signals via its own out-ports, and also sequences of test signals on the I^2C-bus.

Slaves connected to the I^2C-bus and addressed by the test signals shall acknowledge the addressing. Notice that the MTCXO oscillator and the GPIB interface are options and thus will acknowledge the addressing only if they are installed.

Many functions in the input amplifiers are controlled by I/O circuits connected to the I^2C-bus. To check these circuits, test data is sent from the processor to the circuits via the I^2C-bus. The reply signals from the I/O circuits form a settled test-signal pattern which can be verified.

The time of the complete test sequence is 44 ms and the sequence is renewed after further 6 ms. The sequence contains 16 parts, each with a duration time of 2.7 ms, see figure 72.

These 16 sequence parts are similar, except for one section of each part in which data to the I/O circuits are located. These sections contain relay data and are addressed to that particular circuit which controls the relays. This relay data causes the counter to buzz while running the *"Extended Test Program"*. By moving the test jumper to the NORM position (to quieten the relays) these sections are removed from the sequence parts, without altering anything else in the sequence.

After moving the test jumper to the NORM position the sequence part is shortened by 0.3 ms, the duration time will be 2.4 ms and the time of the complete sequence 39 ms.

After the test communication from the out-ports of the processor, four addressings to the slaves are sent via the I^2C-bus, see figure 72. These addressings are not followed by any data. After that, four new addressings are sent, each one followed by one byte of data. This data is changed between the 16 sequence parts.

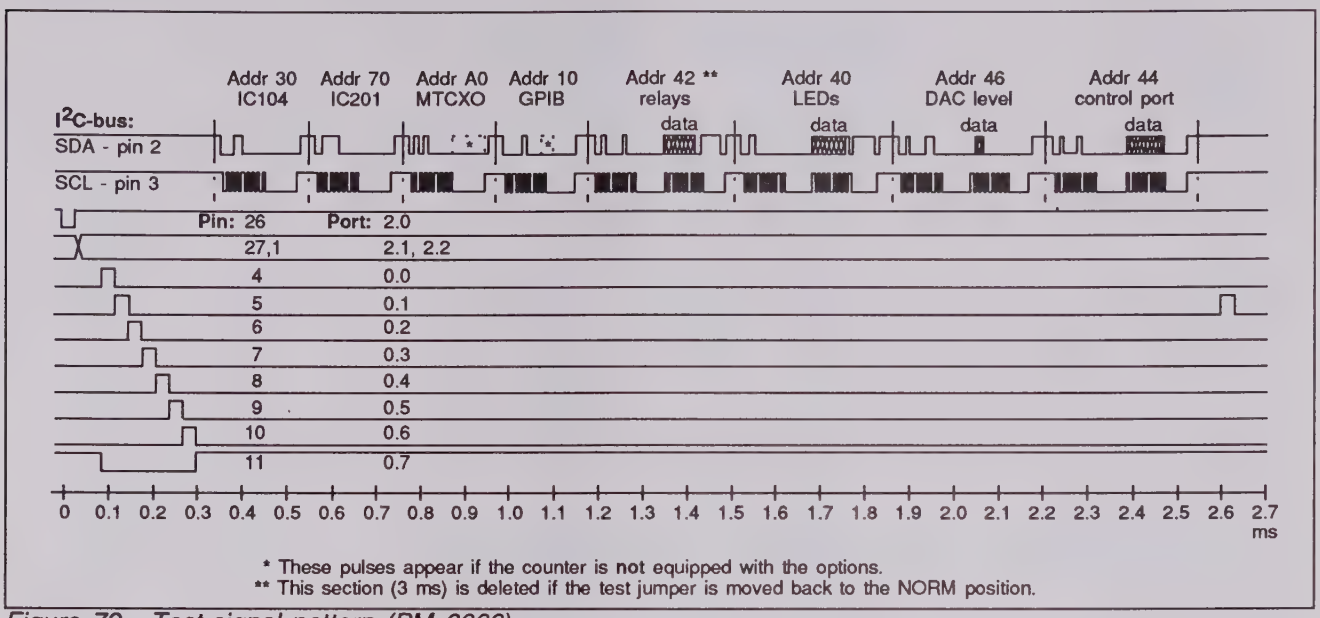

Figure 72. Test-signal pattern (PM 6666).

"Pin" in figure 72 gives the pin numbers of the processor.

The levels of port 2.2 and port 2.1 are fixed during the cycle periods of 1.2 ms. Between these periods they change their levels in binary up-counting sequences:

00 01 10 11 00 ..... and so on

Port 2.1 is changed between every period. Port 2.2 is changed between every other period.

Signal sequence:

Port	2.0	30 µs negative pulse
Port	2.1 and 2.2	binary up-counting
Port	0.0	30 µs positive pulse - port 0.7 goes low
Port	0.1	30 µs positive pulse
Port	0.2	30 µs positive pulse
Port	0.3	30 µs positive pulse
Port	0.4	30 µs positive pulse
Port	0.5	30 µs positive pulse
Port	0.6	30 µs positive pulse - port 0.7 goes high
I²C-bus	address 30H	IC104
I²C-bus	address 70H	display driver IC201
I²C-bus	address A0H	MTCXO oscillator
I²C-bus	address 10H	GPIB interface
I²C-bus	address 42H	relay port DATA in the second cycle
I²C-bus	address 40H	LED port DATA in the second cycle
I²C-bus	address 46H	DAC level DATA in the second cycle
I²C-bus	address 44H	control port DATA in the second cycle
Port	0.1	30 µs positive pulse

The data sent to the four I/O circuits in the 16 sequence parts:

Data port:				The 44H port controls:			
42H	**40H**	**46H**	**44H**	**DAC**	**Pol.**	**Level**	**Sensitivity**
00	00	00	00	A	+	0	variable
01	01	10	01	A	-	0	variable
03	03	20	02	A	+	level	variable
07	07	30	03	A	-	level	variable
0F	0F	40	04	A	+	0	max
1F	1F	50	05	A	-	0	max
3F	3F	60	06	A	+	level	max
7F	7F	70	07	A	-	level	max
FF	FF	00	80	B	+	0	variable
FE	FE	10	90	B	-	0	variable
FC	FC	20	A0	B	+	level	variable
F8	F8	30	80	B	-	level	variable
F0	F0	40	C0	B	+	0	max
E0	E0	50	D0	B	-	0	max
C0	C0	60	E0	B	+	level	max
80	80	70	F0	B	-	level	max
00	00	00	00	A	+	0	variable
01	01	10	01	A	-	0	variable

- and so on -

The **42H** port controls the relay driver in the input amplifiers.

The **40H** port controls the LED driver (key-top LEDs), which indicate correct function by blinking.

The **46H** port controls the DAC circuit which supplies the voltage levels to the trigger- and sensitivity functions. While running the *"Extended Test Program"* the DAC circuit receives data, which converts to one ramp level on the output pin 3, and a second ramp level on the output pin 19. The ramp levels are shown in figure 73.

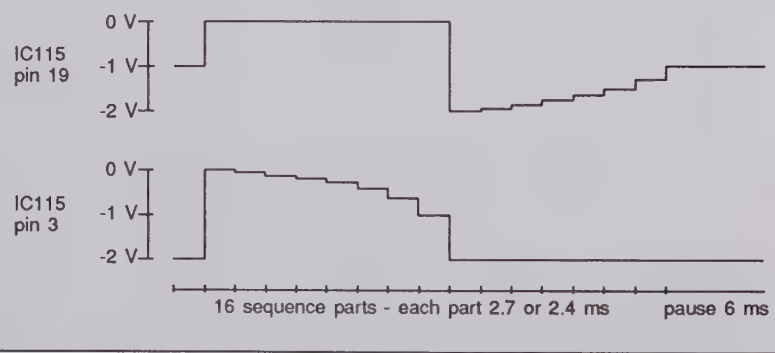

Figure 73. The test levels of the DAC circuit.

The **44H** port controls those analog switches in the circuitry which direct the voltage levels of the DAC circuit to the correct receivers. The right-hand part of the table above displays the selected signal paths in consequence of varying data of the 44H port. The columns have the following meanings:

DAC refers to the DAC circuit IC115 and gives the letter (A or B) of the used output, see figure 73.

Pol. shows whether the output voltage from the DAC circuit is sent as a positive or as a negative level. If a negative level is to be sent, the positive voltage from the DAC is converted to a negative level by an op-amplifier.

Level tells whether the output voltage from the DAC circuit is sent ("level") or if ground is sent ("0").

Sensitivity tells whether the output voltage from the DAC circuit is sent ("variable") or if a fixed voltage, which represents the maximum of the sensitivity, is sent ("max").

The curves on "trigger level A", "trigger level B", "sensitivity A", and "sensitivity B" from the comparator IC111, while running the "*Extended Test Program*", are shown in figure 74.

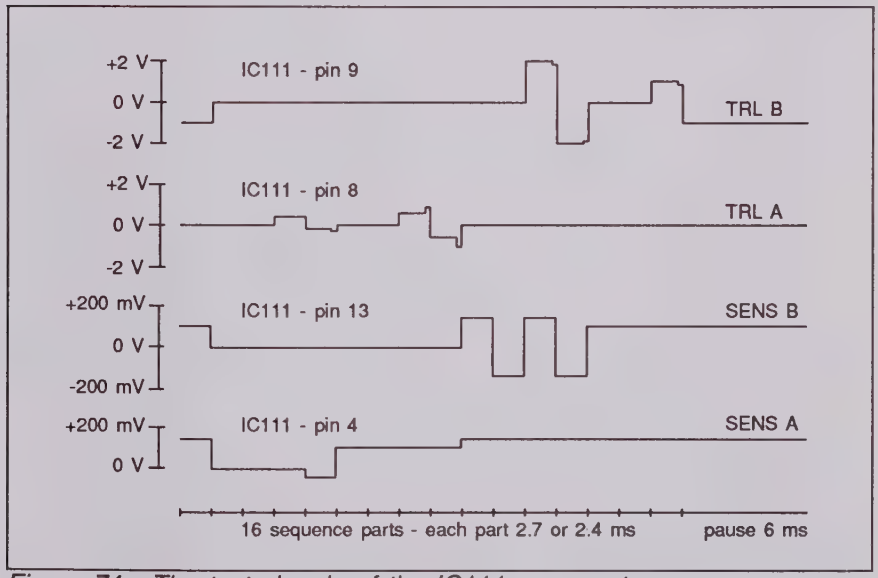

Figure 74. The test signals of the IC111 comparator.

Measuring setup for the oscilloscope:

- Set negative trig slope on port 2.0 (the best measuring port) or SDA.

To display part of the sequence:

- Set MTB to 0.2 ms/div. Use the variable control to stabilize the trace.
- Set DTB to 20 µs/div to monitor the I^2C-bus.

To display the complete sequence:

- Set MTB to 5 ms/div. Use the variable control to stabilize the trace.
- Set DTB to 20 µs/div to monitor the I^2C-bus.

- ***Counting Fault***

- Switch on the counter.
- Connect the LF synthesizer to input A and B.
- Set the frequency to 10 kHz sine wave.
- Set the signal amplitude to 0.5 V_{p-p}.
- Connect the oscilloscope probe to IC104 pin 3 (APRI).

The frequency of the input signal, divided by 10, shall be displayed as a CMOS square-wave signal.

If this signal is missed, try to manipulate the input controls. Deselect AUTO (PM 6666).

No signal at IC104 pin 3 indicates an input amplifier fault.

Miscounting in spite of correct signal at IC104 pin 3 indicates a fault in the IC104 circuit or an incorrect reference signal to the IC104.

- Move the probe to IC104 pin 2 (A).

The 10 kHz input signal shall be displayed. This signal is used for single period measurements, among other things.

- Move the signal source to input B and the probe to IC104 pin 1 (B).

The 10 kHz input signal shall be displayed. This signal is used for ratio measurements, among other things.

If no counting is performed, but correct signals are entered the IC104 circuit, run the *"Extended Test Program"* to check the internal communication between the ICs. Correct signal pattern on the I^2C-bus in this test indicates a fault in the IC104 circuit.

Perform the procedure *"Faulty Push Button"* to verify correct codes for identity, options, and buttons.

- ***Faulty Push Button***

- Switch off the counter.
- Move the test jumper on the basic board to the TEST position.
- Switch on the counter.
- Press the CALIB button on the basic board.

The counter shall display correct codes for pushed buttons. The tables for the codes are given on page 42 under *"Push Buttons"*.

If the counter displays a code without a button being pushed, either that button is conducing all the time, or the decoding circuitry is faulty.

A faulty decoding circuitry can be detected by reading the test pattern in the "Extended Test Program", see page 62 (PM 6665), or page 64 (PM 6666).

• *HF Input (option)*

Power up the instrument at least 10 minutes before measuring to let it attain normal working temperature.

Required measuring equipment, see page 7.

Counting Level

- Interconnect TP1 (BU302) and TP2 (BU304). The location of these can be seen in figure 75 on page 70.
- Perform the *"Sensitivity"* check described on page 49.
- Decrease the level from the "start counting" level until the instrument counts incorrectly. Increase the level again until the instrument counts correctly.

  The lowest level for which the instrument counts correctly shall be equal to, or more than 3 dB below the start counting level, see the diagram on page 49. If not, perform the *"Input Protection and Amplifier"* check (page 70).

  If the HF input passes the *"Input Protection and Amplifier"* check but fails the *"Counting Level"* check, the divider is faulty.

- Disconnect TP1 (BU302) from TP2 (BU304).

Input Protection; DC Levels

- Test jumper JP101 shall be in the NORM position.
- Switch on the counter.
- Connect the oscilloscope to the node GR304-C304-R312-L301.
- Connect the pulse generator to the HF input.
- Set the generator frequency to 100 MHz.
- Set the signal amplitude to 16 dBm (4 V_{p-p}) square wave.

  The DC level shall be between -200 mV and -600 mV.

  If the DC level is equal to or lower than -800 mV, GR311 is probably an open circuit.

  If the DC level is equal to or lower than -50 mV, GR311 is probably short-circuited or GR303/GR304 faulty.

- Move the oscilloscope probe to the node GR303-GR304-C302-C303.

  The DC level shall be between -100 mV and -300 mV.

  If the DC level is higher than +600 mV then GR303 may be open circuit.

  If the DC level is lower than -600 mV then GR304 may be open circuit.

  If either of the diodes GR303 or GR304 is short-circuited, the DC level will be almost 0 volts.

Input Protection and Amplifier

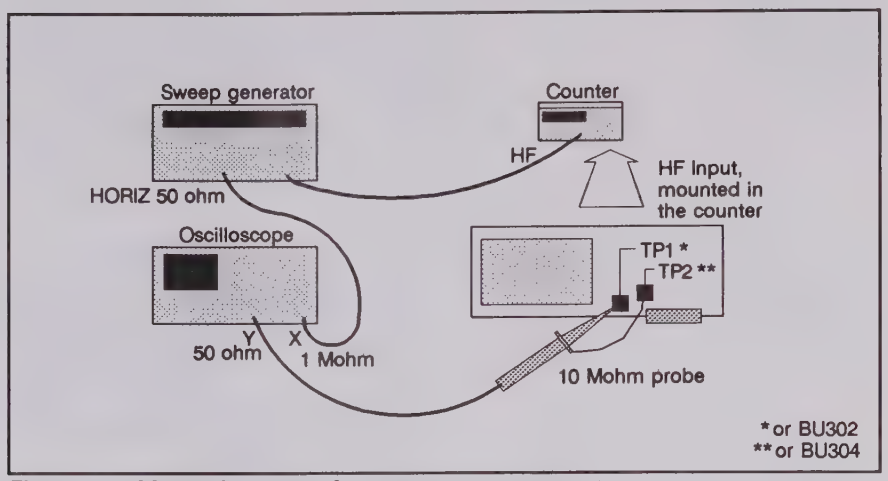

Figure 75. Measuring setup for sweep measurement.

- Connect the sweep generator to the HF input.
- Connect the horizontal output from the generator to the X channel of the oscilloscope.
- Connect the Y channel of the oscilloscope to BU302 and BU304 (ground) via the 10 Mohm probe.
- Set the sweep generator to the frequency range 70 - 1300 MHz.
- Set the signal amplitude to -15 dBm (40 mV_{p-p}).
- Typical frequency curves for the types PM 9608, PM 9608B, and PM 9615 are illustrated in figure 76.

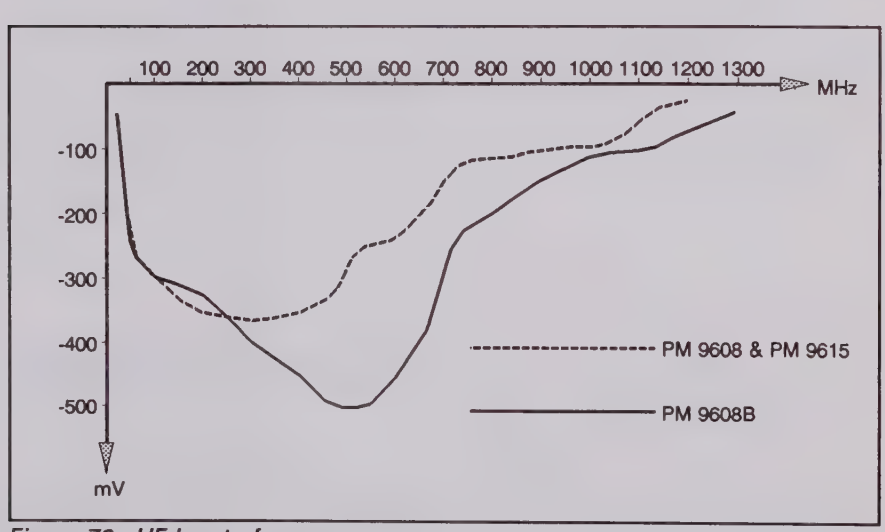

Figure 76. HF Input - frequency curve.

- ***MTCXO Oscillator (option)***

The MTCXO oscillator must be sent to the factory for repair.

- ***Battery Unit (option)***

The battery unit must be installed in a counter during testing.

Required measuring equipment, see page 7.

Fuses

Check fuse VL1. Replace it with a 1.6 A slow blow fuse, if necessary.

If the battery unit still does not work, the PCB-conductor fuse between P2 and the minus pole of C49 may be blown (see figure 77). Replace it with a piece of wire if burnt.

Buzzing relay

The relay buzzes if either thermistor R19 is in contact with the case or the battery is more discharged than what the battery unit allows it to be.

+5 V Regulator

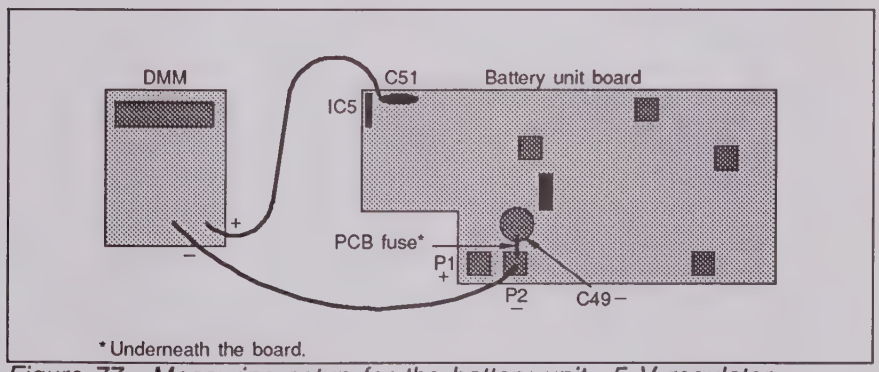

Figure 77. Measuring setup for the battery unit +5 V regulator.

- Disconnect the power cable.
- Connect the DMM and the oscilloscope between the +5 V output (node IC5 pin 2, C51) and ground (P2). See figure 77.
- Switch on the counter.
- The DMM shall display 5 V ±0.2 V.
- The ripple shall not exceed 30 mV_{p-p}. The ripple is generated by the -5 V switching regulator.

Battery ON/OFF Logic

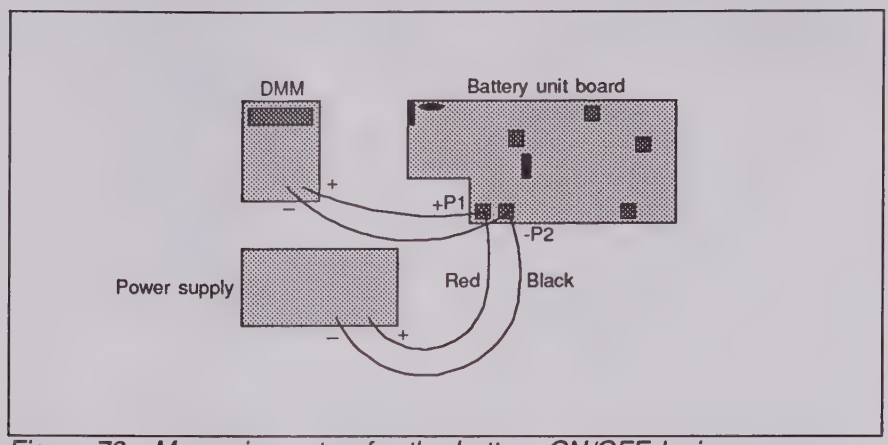

Figure 78. Measuring setup for the battery ON/OFF logic.

- Disconnect the battery from the battery unit.
- Connect the DMM to P1 and P2, see figure 78.
- Connect the power supply between P1 and P2.
- Set the voltage from power supply to 5.3 V.
- Watch the display, and slowly lower the voltage.
- The display shall go out at 5.1 V ±0.1 V.

REPLACEMENT PARTS

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NOTE: 'No stock item' is a Replacement Part not normally kept in stock. Items can be ordered but the delivery time will be longer than normal.

PM 6665
Mechanical Parts

POS	SERVICE CODE	DESCRIPTION
	5322 268 10275*	Receptacle, 140825-2 2.8X.8
	5322 267 10004	Connector, KC-79-35, To Input A & B
	5322 121 42352	Mains filter, 1 A, FN326-1/07
	4822 502 30095*	Screw, RXK B6X8 ST FZB POZ
	4822 502 11152*	Screw, MRX 4X10 ST FZB POZ
	4822 502 10232*	Screw, MRX 4X14 ST FZB POZ
	4822 530 80173*	Spring washer, KBA 3.2 ST FZ DIN137
	4822 530 80173*	Spring washer, KBA 3.2 ST FZ DIN137
	4822 530 80164*	Spring washer, KBA 4.3 ST FZ DIN137
	4822 530 80083*	Lock washer, YT4.3 ST FZ DIN6798A
	5322 502 12003*	Screw, MFXTT 3X8 ST FZ POZ
	4822 502 11835*	Screw, MRXTT 3X6 ST FZ POZ
	4822 502 11835*	Screw, MRXTT 3X6 ST FZ POZ
	4822 502 11473*	Screw, MRXTT 3X8 ST FZ POZ
	4822 505 10326*	Nut, M6M 04 ST FZB
	5322 321 22565	Cable assy, L= 75 MINI-BNC, To input A & B
	5322 218 70104*	PC-B assy 1
	5322 218 70102*	PC-B assy 2
	5322 130 90413	Display
	5322 267 70208	Zebra strip, To display
	5322 401 11259*	PC-B guide, To Oscillator & HF-Input
	5322 447 91683*	Front part, Brown
	5322 447 91443*	Cover, Beige
	5233 218 70106	PC-B support, (Inside the cover)
	5322 462 41115*	Rear foot, Beige
	5322 401 11102	Tilting support
	5322 447 91688*	Rear panel, Brown
	5322 255 40946*	Heat sink, To IC106 & 107
	5322 447 91689*	Front plate, Beige
	5322 498 10263	Extension bar
	5322 456 30052	Logostrip, PM6665 120 MHz/1.1 GHz, Black
	5322 456 30043	Logostrip, PM6665 1.0 GHz, Black
	5322 456 30047	Logostrip, PM6665 1.0 GHz, Grey
	5322 456 30053	Logostrip, PM6665 1.3 GHz, Black
	5322 456 30057	Logostrip, PM6665 1.3 GHz, Grey
	5322 462 41116	Bottom foot
	5322 462 41117	Rubber foot, To bottom foot
	5322 447 91681*	Shield, (between input amplifier & counter logic)
	5322 263 50164*	Plug, for BNC-hole, Brown
	5322 401 11262	Semi protection
	5322 447 91682*	Shield, to input amplifier
	5322 535 92899*	Distance nut, M3X22.5
	5322 447 91692	Semi protection sold side, 86X402 mm
	5322 460 60508	Semi protection, 20X26 mm
	5322 381 11049	Window
	5322 492 63808	Spring, to bottom foot
	5322 532 52097*	Insulating washer, 3.2X8X1X
	5322 358 50107*	Cable clip, reel, SRB-2.5T-M4
	5322 456 90365*	Earth sign, 8 mm, 3S 6 DIN40011 RT
	5322 321 40117*	Protect sleeve, 2.80 mm, N 94610

*No stock item.

PM 6665
Mechanical Parts, cont...

POS	SERVICE CODE	DESCRIPTION
	5322 456 90366*	High voltage, WARNING
	5322 321 10617*	Mains cable, 1.80 M, SW 432-3X.75MM2-881
	5322 321 10618*	Mains cable, 1.80 M, EU 426U-3X.75MM2-881
	5322 321 10123*	Mains cable, 2.40 M, US 439-3X.82MM2-881
	5322 321 20816*	Mains cable, 2.50 M, GB BS1363/A

PM 6665
Basic Board, U1

POS	SERVICE CODE	DESCRIPTION
BU101	5322 265 40379	Connector, 5 pol, 22-05-1059 3094-05F
BU102	5322 265 40634	Connector, 12 pol, 76382-312
BU103	5322 265 64028	Connector, 10 pol, 22-03-2101 4030-10A
BU104	5322 265 64028	Connector, 10 pol, 22-03-2101 4030-10A
BU105	5322 265 64028	Connector, 10 pol, low profile header
BU105	5322 265 40197	Connector, 10 pol, F095 double row
BU197	5322 268 14141	Contact pin, minicoax for PC-B
BU197	5322 268 24116	Bushing, minicoax for PC-B
BU198	5322 268 14141	Contact pin, minicoax for PC-B
BU198	5322 268 24116	Bushing, minicoax for PC-B
C101	5322 124 10684	Capacitor, 15 µF, 20%6.3V 6.0X3.2 MOLD
C102	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C103	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C106	5322 124 10684	Capacitor, 15 µF, 20%6.3V 6.0X3.2 MOLD
C107	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C108	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C112	4822 121 41677	Capacitor, 10 nF, 10% 400V 4X10.5 3M
C113	5322 125 50051	Capacitor, 18 pF, 2.0-18 pF 300V
C116	5322 122 33862	Capacitor, 10 pF, 5% 200V C0G 0805
C117	5322 125 50049	Capacitor, 10 pF, 1,8-10 pF 300V
C118	5322 124 10684	Capacitor, 15 µF, 20%6.3V 6.0X3.2 MOLD
C119	5322 121 50265	Capacitor, 100 nF, 10% 63V X7R 1206
C120	5322 122 32452	Capacitor, 47 pF, 5% 50V NP0 0805
C121	5322 122 32452	Capacitor, 47 pF, 5% 50V NP0 0805
C122	5322 121 50265	Capacitor, 100 nF, 10% 63V X7R 1206
C123	5322 124 10685	Capacitor, 2.20 µF, 20%6.3V 3.2X1.6 MOLD
C126	5322 121 50265	Capacitor, 100 nF, 10% 63V X7R 1206
C127	5322 124 41367	Capacitor, 6800 µF, 20% 16V ECEA1CU682
C128	5322 124 41366	Capacitor, 2200 µF, 20% 16V ECEA1CU222
C129	5322 124 10686	Capacitor, 1 µF, 20% 16V 3.2X1.6 MOLD
C130	5322 124 10686	Capacitor, 1 µF, 20% 16V 3.2X1.6 MOLD
C131	5322 124 10685	Capacitor, 2.20 µF, 20%6.3V 3.2X1.6 MOLD
C132	5322 124 10685	Capacitor, 2.20 µF, 20%6.3V 3.2X1.6 MOLD
C134	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C137	5322 122 32269	Capacitor, 68 pF, 5% 50V NP0 0805

* No stock item.

PM 6665
Basic Board, U1, cont...

POS	SERVICE CODE	DESCRIPTION
C138	5322 122 32531	Capacitor, 100 pF, 5% 50V NP0 0805
C139	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C140	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C141	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C142	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C143	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C144	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C145	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C146	5322 121 50265	Capacitor, 100 nF, 10% 63V X7R 1206
C147	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C148	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C149	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C152	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C153	4822 121 41677	Capacitor, 10 nF, 10% 400V 4X10.5 3M
C154	5322 122 33862	Capacitor, 10 pF, 5% 200V C0G 0805
C155	5322 125 50051	Capacitor, 18 pF, 2.0-18 pF 300V
C159	5322 125 50049	Capacitor, 10 pF, 1,8-10 pF 300V
C160	5322 122 32269	Capacitor, 68 pF, 5% 50V NP0 0805
C161	5322 122 32531	Capacitor, 100 pF, 5% 50V NP0 0805
C162	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C163	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C164	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C165	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C166	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C167	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C168	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C169	5322 121 50265	Capacitor, 100 nF, 10% 63V X7R 1206
C170	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C171	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C172	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C173	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C174	5322 122 33862	Capacitor, 10 pF, 5% 200V C0G 0805
C175	5322 122 33862	Capacitor, 10 pF, 5% 200V C0G 0805
C176	5322 122 31863	Capacitor, 330 pF, 5% 50V NP0 0805
C177	5322 122 31863	Capacitor, 330 pF, 5% 50V NP0 0805
C178	5322 122 33862	Capacitor, 10 pF, 5% 200V C0G 0805
C179	5322 122 33862	Capacitor, 10 pF, 5% 200V C0G 0805
C180	5322 122 33862	Capacitor, 10 pF, 5% 200V C0G 0805
C181	5322 122 33862	Capacitor, 10 pF, 5% 200V C0G 0805
GR101	5322 130 32739	Diode, 0.35 W, BZX84-C3V0 SOT23
GR102	4822 130 32656	Diode, 0.1 A, BA483 35V DO34
GR103	4822 130 32656	Diode, 0.1 A, BA483 35V DO34
GR104	5322 130 32739	Diode, 0.35 W, BZX84-C3V0 SOT23
GR105	5322 130 32739	Diode, 0.35 W, BZX84-C3V0 SOT23
GR106	4822 130 32656	Diode, 0.1 A, BA483 35V DO34
GR107	4822 130 32656	Diode, 0.1 A, BA483 35V DO34
GR108	5322 130 32739	Diode, 0.35 W, BZX84-C3V0 SOT23
GR109	5322 130 34337	Diode, 0.1 A, BAV99 SOT23
GR111	5322 130 30691	Diode, 0.25 A, BAW56 70V SOT23
GR112	5322 130 30691	Diode, 0.25 A, BAW56 70V SOT23

* No stock item.

PM 6665
Basic Board, U1, cont...

POS	SERVICE CODE	DESCRIPTION
GR114	4822 130 32003	Bridge rectif, 4 A, KBL02 200V
GR115	5322 130 30691	Diode, 0.25 A, BAW56 70V SOT23
GR117	5322 130 30691	Diode, 0.25 A, BAW56 70V SOT23
IC101	5322 209 83069	IC, TLC271CP DIL-8
IC102	5322 209 83069	IC, TLC271CP DIL-8
IC103	5322 255 44107	IC-socket, 16 pol, DIL
IC103	5322 209 82866	IC, AM687DL
IC104	5322 209 71559	LSI, OQ0501
IC104	5322 255 40421	IC-socket, 24 pol, DIL
IC105	5322 209 51241	IC-microp, MAB8461
IC105	5322 255 40234	IC-socket, 28 pol, DIL
IC106	5322 401 11257	Clamp, TO220
IC106	5322 466 61813	Insulating washer, 15X22 CLIP TO220
IC106	5322 209 84454	IC, 5 V, MC7805CT 1A TO-220
IC107	5322 492 70235	Spring
IC107	5322 466 61813	Insulating washer, 15X22 CLIP TO220
IC107	5322 130 44843	IC, -5 V, MC7905CT 1A TO-220
IC108	5322 209 86203	IC, MC10138P
IC109	5322 209 70313	IC, MC10125P
IC110	5322 209 71555	IC, PC74HC373T SO-20
JP101	5322 265 60251	Connector, 4 pol, F095 double row
JP306	5322 263 50101	Connector, 2 pol, F095 jumper
P1	5322 290 34064	Flat pin, 2.80 mm, E184/8 LESA SN BAND
P2	5322 290 34064	Flat pin, 2.80 mm, E184/8 LESA SN BAND
R101	5322 111 90094	Resistor, 10 MΩ, 10% 1/4 W RC-01 1206
R103	5322 116 80447	Resistor, 470 kΩ, 1% 1/8 W 100PPM 1206
R105	5322 116 80429	Resistor, 100 kΩ, 1% 1/8 W 100PPM 1206
R106	4822 111 90169	Resistor, 560 kΩ, 5% 1/4 W RC-01 1206
R107	4822 111 90169	Resistor, 560 kΩ, 5% 1/4 W RC-01 1206
R108	5322 116 80451	Resistor, 68 kΩ, 1% 1/8 W 100PPM 1206
R109	5322 116 80444	Resistor, 470 Ω, 1% 1/8 W 100PPM 1206
R111	5322 116 80426	Resistor, 100 Ω, 1% 1/8 W 100PPM 1206
R112	5322 116 80445	Resistor, 4.70 kΩ, 1% 1/8 W 100PPM 1206
R113	5322 116 80441	Resistor, 33 kΩ, 1% 1/8 W 100PPM 1206
R114	5322 116 80444	Resistor, 470 Ω, 1% 1/8 W 100PPM 1206
R115	4822 111 90169	Resistor, 560 kΩ, 5% 1/4 W RC-01 1206
R116	5322 116 80429	Resistor, 100 kΩ, 1% 1/8 W 100PPM 1206
R117	5322 414 30044	Knob, 10 mm, Brown SP=4 no line
R117	5322 414 70016	Cover, 8 mm, Brown whith line
R117	5322 101 20941	Potentiometer, 1 kΩ
R118	5322 116 80427	Resistor, 1 kΩ, 1% 1/8 W 100PPM 1206
R119	5322 116 80427	Resistor, 1 kΩ, 1% 1/8 W 100PPM 1206
R121	5322 116 80427	Resistor, 1 kΩ, 1% 1/8 W 100PPM 1206
R122	5322 116 80428	Resistor, 10 kΩ, 1% 1/8 W 100PPM 1206
R123	5322 116 80426	Resistor, 100 Ω, 1% 1/8 W 100PPM 1206
R125	5322 116 80427	Resistor, 1 kΩ, 1% 1/8 W 100PPM 1206
R126	5322 111 90113	Resistor, 560 Ω, 1% 1/8 W 100PPM 1206
R127	5322 116 80429	Resistor, 100 kΩ, 1% 1/8 W 100PPM 1206
R128	5322 116 80439	Resistor, 3.30 kΩ, 1% 1/8 W 100PPM 1206
R129	5322 100 11143	Potentiometer, 10 kΩ, 25% 1/10 W 3304X-1-103

* No stock item.

PM 6665
Basic Board, U1, cont...

POS	SERVICE CODE	DESCRIPTION
R130	5322 116 80428	Resistor, 10 kΩ, 1% 1/8 W 100PPM 1206
R131	5322 101 10989	Potentiometer, 100 Ω, CVR-4A-101
R132	5322 116 80444	Resistor, 470 Ω, 1% 1/8 W 100PPM 1206
R133	5322 116 80444	Resistor, 470 Ω, 1% 1/8 W 100PPM 1206
R134	5322 116 80444	Resistor, 470 Ω, 1% 1/8 W 100PPM 1206
R135	5322 116 80444	Resistor, 470 Ω, 1% 1/8 W 100PPM 1206
R136	5322 116 80427	Resistor, 1 kΩ, 1% 1/8 W 100PPM 1206
R137	5322 116 80427	Resistor, 1 kΩ, 1% 1/8 W 100PPM 1206
R138	5322 116 80444	Resistor, 470 Ω, 1% 1/8 W 100PPM 1206
R139	5322 111 90094	Resistor, 10 MΩ, 10% 1/4 W RC-01 1206
R141	4822 111 90169	Resistor, 560 kΩ, 5% 1/4 W RC-01 1206
R142	4822 111 90169	Resistor, 560 kΩ, 5% 1/4 W RC-01 1206
R143	5322 116 80451	Resistor, 68 kΩ, 1% 1/8 W 100PPM 1206
R146	5322 116 80445	Resistor, 4.70 kΩ, 1% 1/8 W 100PPM 1206
R147	5322 116 80432	Resistor, 1.50 kΩ, 1% 1/8 W 100PPM 1206
R148	5322 116 80432	Resistor, 1.50 kΩ, 1% 1/8 W 100PPM 1206
R149	5322 116 80428	Resistor, 10 kΩ, 1% 1/8 W 100PPM 1206
R151	5322 116 80447	Resistor, 470 kΩ, 1% 1/8 W 100PPM 1206
R152	5322 116 80447	Resistor, 470 kΩ, 1% 1/8 W 100PPM 1206
R153	5322 116 80447	Resistor, 470 kΩ, 1% 1/8 W 100PPM 1206
R154	5322 116 80449	Resistor, 680 Ω, 1% 1/8 W 100PPM 1206
R157	5322 116 80426	Resistor, 100 Ω, 1% 1/8 W 100PPM 1206
R158	5322 116 80444	Resistor, 470 Ω, 1% 1/8 W 100PPM 1206
R159	5322 116 80429	Resistor, 100 kΩ, 1% 1/8 W 100PPM 1206
R160	5322 116 80447	Resistor, 470 kΩ, 1% 1/8 W 100PPM 1206
R161	5322 116 80428	Resistor, 10 kΩ, 1% 1/8 W 100PPM 1206
R162	5322 116 80426	Resistor, 100 Ω, 1% 1/8 W 100PPM 1206
R164	5322 116 80427	Resistor, 1 kΩ, 1% 1/8 W 100PPM 1206
R165	5322 414 30044	Knob, 10 mm, Brown SP=4 no line
R165	5322 414 70016	Cover, 8 mm, brown whith line
R165	5322 101 20941	Potentiometer, 1 kΩ
R166	5322 116 80427	Resistor, 1 kΩ, 1% 1/8 W 100PPM 1206
R167	5322 116 80444	Resistor, 470 Ω, 1% 1/8 W 100PPM 1206
R168	5322 116 80445	Resistor, 4.70 kΩ, 1% 1/8 W 100PPM 1206
R169	4822 111 90169	Resistor, 560 kΩ, 5% 1/4 W RC-01 1206
R170	5322 116 80441	Resistor, 33 kΩ, 1% 1/8 W 100PPM 1206
R171	5322 116 80429	Resistor, 100 kΩ, 1% 1/8 W 100PPM 1206
R173	5322 116 80427	Resistor, 1 kΩ, 1% 1/8 W 100PPM 1206
R174	5322 111 90113	Resistor, 560 Ω, 1% 1/8 W 100PPM 1206
R175	5322 116 80429	Resistor, 100 kΩ, 1% 1/8 W 100PPM 1206
R176	5322 116 80439	Resistor, 3.30 kΩ, 1% 1/8 W 100PPM 1206
R177	5322 100 11143	Potentiometer, 10 kΩ, 25% 1/10 W 3304X-1-103
R178	5322 116 80444	Resistor, 470 Ω, 1% 1/8 W 100PPM 1206
R179	5322 116 80444	Resistor, 470 Ω, 1% 1/8 W 100PPM 1206
R180	5322 116 80427	Resistor, 1 kΩ, 1% 1/8 W 100PPM 1206
R181	5322 116 80444	Resistor, 470 Ω, 1% 1/8 W 100PPM 1206
R182	4822 111 90154	Resistor, 270 Ω, 1% 1/8 W 100PPM 1206
R183	4822 111 90154	Resistor, 270 Ω, 1% 1/8 W 100PPM 1206
R184	5322 111 90094	Resistor, 10 MΩ, 10% 1/4 W RC-01 1206
R185	5322 116 80448	Resistor, 47 Ω, 1% 1/8 W 100PPM 1206

* No stock item.

PM 6665
Basic Board, U1, cont...

POS	SERVICE CODE	DESCRIPTION
R186	5322 111 90094	Resistor, 10 MΩ, 10% 1/4 W RC-01 1206
R187	5322 116 80448	Resistor, 47 Ω, 1% 1/8 W 100PPM 1206
R188	5322 116 80429	Resistor, 100 kΩ, 1% 1/8 W 100PPM 1206
R189	5322 116 80429	Resistor, 100 kΩ, 1% 1/8 W 100PPM 1206
SK103	5322 414 20031	Push button, VKS, 6.5X6.5 L-BR 30304
SK103	4822 276 11076	Key switch, 1 pol, DW-5112 TYPE VKS
SK104	5322 277 21124	Voltage switch, V202-12-MA-08-Q
SK106	5322 414 20033	Push button, SCHAD, 6X10 M-BR 30304 ALPS
SK106	5322 276 12192	Push switch, 1 CELL
SK109	5322 414 20033	Push button, SCHAD, 6X10 M-BR 30304 ALPS
SK109	5322 276 60257	Push switch, 6 CELL
SK111	5322 414 20033	Push button, SCHAD, 6X10 M-BR 30304 ALPS
SK111	5322 276 60257	Push switch, 6 CELL
SK115	5322 414 20033	Push button, SCHAD, 6X10 M-BR 30304 ALPS
SK115	5322 276 60257	Push switch, 6 CELL
SK117	5322 414 20033	Push button, SCHAD, 6X10 M-BR 30304 ALPS
SK117	5322 276 60257	Push switch, 6 CELL
SK119	5322 414 20033	Push button, SCHAD, 6X10 M-BR 30304 ALPS
SK119	5322 276 60257	Push switch, 6 CELL
SK120	5322 414 20033	Push button, SCHAD, 6X10 M-BR 30304 ALPS
SK120	5322 276 60257	Push switch, 6 CELL
TP7	5322 265 60251	Connector, 4 pol, F095 DOUBLE ROW
TR101	5322 146 21229	Transformer
TS101	5322 130 44787	Transistor, BFR31 .01A 25V SOT23
TS102	5322 130 40781	Transistor, BFS17 .05A 15V SOT23
TS103	5322 130 44787	Transistor, BFR31 .01A 25V SOT23
TS104	5322 130 40781	Transistor, BFS17 .05A 15V SOT23

* No stock item.

PM 6666 Mechanical Parts

POS	SERVICECODE	DESCRIPTION
	5322 268 10275*	Receptacle, 140825-2 2.8X0.8
	5322 267 10004	Connector, KC-79-35, to Input A & B
	5322 121 42352	Mains filter, 1 A, FN326-1/07
	4822 502 11086*	Screw, MCS 2.5X04 ST FZB
	4822 502 30095*	Screw, RXK B6X08 ST FZB POZ
	4822 502 11152*	Screw, MRX 4X10 ST FZB POZ
	4822 502 10232*	Screw, MRX 4X14 ST FZB POZ
	4822 530 80173*	Spring washer, KBA 3.2 ST FZ DIN137
	4822 530 80164*	Spring washer, KBA 4.3 ST FZ DIN137
	4822 530 80083*	Lock washer, YT4.3 ST FZ DIN6798A
	5322 502 12003*	Screw, MFXTT 3X08 ST FZ POZ
	5322 502 13265*	Screw, MRXTT 3X06 ST FZ POZ
	4822 502 11473*	Screw, MRXTT 3X08 ST FZ POZ
	4822 505 10326*	Nut, M6M 04 ST FZB
	5322 321 22314	Cable assy, L=130 MINI-BNC, to Input A & B
	5322 321 22565	Cable assy, L= 75 MINI-BNC, to Input A & B
	5322 218 70105*	PC-B assy 1
	5322 218 70102*	PC-B assy 2
	5322 218 70107*	PC-B assy 5
	5322 130 90413	Display
	5322 267 70208	Zeebra strip, to display
	5322 401 11259*	PC-B guide, to oscillator & HF-Input
	5322 447 91683*	Front part, Brown
	5322 447 91443*	Cover, Beige
	5233 218 70106	PC-B support, (inside the cover)
	5322 462 41115*	Rear foot, Beige
	5322 401 11102	Tilting assembly
	5322 447 91688*	Rear panel, Brown
	5322 255 40946*	Heat sink, to IC106 & 107
	5322 498 10263	Extension bar
	5322 462 41116	Bottom foot
	5322 462 41117	Rubber foot, to bottom foot
	5322 447 91681*	Shield, (between input amplifier & counter logic)
	5322 263 50164*	Plug, for BNC-hole, Brown
	5322 401 11262	Semi protection
	5322 447 91682*	Shield, to input amplifier
	5322 465 90367	Logostrip, PM6666 120 MHz/1.3 GHz, Black
	5322 456 30044	Logostrip, PM6666 1.0 GHz, Black
	5322 456 30048	Logostrip, PM6666 1.0 GHz, Grey
	5322 456 30054	Logostrip, PM6666 1.3 GHz, Black
	5322 456 30058	Logostrip, PM6666 1.3 GHz, Grey
	5322 447 91691*	Front plate, Beige
	5322 256 91459*	Holder
	5322 535 92899*	Distance nut, M3X22.5
	5322 447 91692	Semi protection sold side, 86X402 mm
	5322 460 60508	Semi protection, 20X26 mm
	5322 381 11049	Window
	5322 492 63808	Spring
	5322 532 52097*	Insulating washer, 3.2X8X1X
	5322 529 50202*	Rivet nut, M3X19/1.5

* No stock item.

PM 6666
Mechanical Parts, cont...

POS	SERVICE CODE	DESCRIPTION
	5322 358 50107*	Cable clip, reel, SRB-2.5T-M4
	5322 456 90365*	Earth sign, 8 mm, 3S 6 DIN40011 RT
	5322 321 40117*	Protect sleeve, 2.80 mm, N 94610
	5322 456 90366*	High voltage-, WARNING
	5322 321 10617*	Mains cable, 1.80 M, SW 432-3X.75MM2-881
	5322 321 10618*	Mains cable, 1.80 M, EU 426U-3X.75MM2-881
	5322 321 10123*	Mains cable, 2.40 M, US 439-3X.82MM2-881
	5322 321 20816*	Mains cable, 2.50 M, GB BS1363/A

PM 6666
Basic Board, U1

POS	SERVICE CODE	DESCRIPTION
BU101	5322 265 40379	Connector, 5 pol, 22-05-1059 3094-05F
BU102	5322 265 40634	Connector, 12 pol, 76382-312
BU103	5322 265 64028	Connector, 10 pol, 22-03-2101 4030-10A
BU104	5322 265 64028	Connector, 10 pol, 22-03-2101 4030-10A
BU105	5322 265 64028	Connector, 10 pol, low profile header
BU106	5322 265 40687	Connector, 16 pol, F095 double row
BU107	5322 268 14141	Contact pin, minicoax for PC-B
BU107	5322 268 24116	Bushing, minicoax for PC-B
BU108	5322 268 14141	Contact pin, minicoax for PC-B
BU108	5322 268 24116	Bushing, minicoax for PC-B
C100	5322 121 40308	Capacitor, 22 nF, 10% 400V
C101	4822 122 31194	Capacitor, 8.20 pF, +-0.25 pF 500V NP0 2M
C102	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C103	5322 122 32452	Capacitor, 47 pF, 5% 50V NP0 0805
C104	5322 125 50051	Capacitor, 18 pF, 2.0-18 pF 300V
C105	5322 122 32418	Capacitor, 15 pF, 2% 500V NP0 2M
C106	5322 125 50051	Capacitor, 18 pF, 2.0-18 pF 300V
C107	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C108	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C109	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C110	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C111	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C112	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C113	5322 121 40308	Capacitor, 22 nF, 10% 400V
C114	4822 122 31194	Capacitor, 8.20 pF, +-0.25 pF 500V NP0 2M
C115	5322 122 32452	Capacitor, 47 pF, 5% 50V NP0 0805
C116	5322 125 50051	Capacitor, 18 pF, 2.0-18 pF 300V
C117	5322 122 32418	Capacitor, 15 pF, 2% 500V NP0 2M
C118	5322 124 10684	Capacitor, 15 µF, 20%6.3V 6.0X3.2 MOLD
C119	5322 121 50265	Capacitor, 100 nF, 10% 63V X7R 1206
C120	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C121	5322 122 32452	Capacitor, 47 pF, 5% 50V NP0 0805
C122	5322 121 50265	Capacitor, 100 nF, 10% 63V X7R 1206
C123	5322 124 10685	Capacitor, 2.20 µF, 20%6.3V 3.2X1.6 MOLD
C124	5322 125 50051	Capacitor, 18 pF, 2.0-18 pF 300V

* No stock item.

PM 6666
Basic Board, U1, cont...

POS	SERVICE CODE	DESCRIPTION
C125	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C126	5322 121 50265	Capacitor, 100 nF, 10% 63V X7R 1206
C127	5322 124 41367	Capacitor, 6800 µF, 20% 16V ECEA1CU682
C128	5322 124 41366	Capacitor, 2200 µF, 20% 16V ECEA1CU222
C129	5322 124 10686	Capacitor, 1 µF, 20% 16V 3.2X1.6 MOLD
C130	5322 124 10686	Capacitor, 1 µF, 20% 16V 3.2X1.6 MOLD
C131	5322 124 10685	Capacitor, 2.20 µF, 20%6.3V 3.2X1.6 MOLD
C132	5322 124 10685	Capacitor, 2.20 µF, 20%6.3V 3.2X1.6 MOLD
C133	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C134	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C135	4822 122 33575	Capacitor, 220 pF, 5% 50V NP0 0805
C137	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C139	5322 122 32452	Capacitor, 47 pF, 5% 50V NP0 0805
C140	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C141	5322 122 32448	Capacitor, 10 pF, 5% 50V NP0 0805
C142	5322 124 10685	Capacitor, 2.20 µF, 20%6.3V 3.2X1.6 MOLD
C171	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C172	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C173	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C174	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C175	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C177	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C179	5322 122 32448	Capacitor, 10 pF, 5% 50V NP0 0805
C180	4822 122 33575	Capacitor, 220 pF, 5% 50V NP0 0805
C181	5322 124 10685	Capacitor, 2.20 µF, 20%6.3V 3.2X1.6 MOLD
C182	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C183	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C184	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C185	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C186	5322 124 10455	Capacitor, 68 µF, 20% 6.3V SOLID AL
C187	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C188	5322 124 10455	Capacitor, 68 µF, 20% 6.3V SOLID AL
C189	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C191	5322 124 10685	Capacitor, 2.20 µF, 20%6.3V 3.2X1.6 MOLD
C192	5322 124 10685	Capacitor, 2.20 µF, 20%6.3V 3.2X1.6 MOLD
C193	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C194	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C195	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C196	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C197	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C198	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C199	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C201	5322 122 32448	Capacitor, 10 pF, 5% 50V NP0 0805
C203	5322 122 32448	Capacitor, 10 pF, 5% 50V NP0 0805
C204	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C205	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C206	5322 124 10684	Capacitor, 15 µF, 20%6.3V 6.0X3.2 MOLD
C207	5322 124 10684	Capacitor, 15 µF, 20%6.3V 6.0X3.2 MOLD
C208	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C209	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805

*No stock item.

PM 6666
Basic Board, U1, cont...

POS	SERVICE CODE	DESCRIPTION
C210	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C211	5322 124 10684	Capacitor, 15 µF, 20%6.3V 6.0X3.2 MOLD
GR100	5322 130 32739	Diode, 0.35 W, BZX84-C3V0 SOT23
GR101	5322 130 32076	Diode, 0.1 A, BAT18 35V 1PF SOT23
GR102	5322 130 34337	Diode, 0.1 A, BAV99 SOT23
GR103	5322 130 34337	Diode, 0.1 A, BAV99 SOT23
GR104	5322 130 34337	Diode, 0.1 A, BAV99 SOT23
GR105	5322 130 34337	Diode, 0.1 A, BAV99 SOT23
GR106	5322 130 34337	Diode, 0.1 A, BAV99 SOT23
GR107	5322 130 32739	Diode, 0.35 W, BZX84-C3V0 SOT23
GR108	5322 130 32076	Diode, 0.1 A, BAT18 35V 1PF SOT23
GR109	5322 130 34337	Diode, 0.1 A, BAV99 SOT23
GR111	5322 130 30691	Diode, 0.25 A, BAW56 70V SOT23
GR112	5322 130 30691	Diode, 0.25 A, BAW56 70V SOT23
GR114	4822 130 32003	Bridge rectif, 4 A, KBL02 200V
GR115	5322 130 30691	Diode, 0.25 A, BAW56 70V SOT23
GR116	5322 130 32076	Diode, 0.1 A, BAT18 35V 1PF SOT23
GR117	5322 130 32739	Diode, 0.35 W, BZX84-C3V0 SOT23
GR118	5322 130 32076	Diode, 0.1 A, BAT18 35V 1PF SOT23
GR119	5322 130 32739	Diode, 0.35 W, BZX84-C3V0 SOT23
GR120	5322 130 80508	LED, 3 mm, Yellow 90°
GR121	5322 130 80508	LED, 3 mm, Yellow 90°
GR122	5322 130 34337	Diode, 0.1 A, BAV99 SOT23
GR123	5322 130 34337	Diode, 0.1 A, BAV99 SOT23
IC100	5322 209 11578	IC, PCF8574T SO-16L
IC101	5322 209 86201	IC, CA3140E DIL8
IC102	5322 209 86201	IC, CA3140E DIL8
IC104	5322 209 71559	LSI, OQ0501
IC104	5322 255 40421	IC-socket, 24 pol, DIL
IC105	5322 209 51439	IC MAB8461
IC105	5322 255 40234	IC-socket, 28 pol, DIL
IC106	5322 401 11257	Clamp, TO220
IC106	5322 466 61813	Insulating washer, 15X22 CLIP TO220
IC106	5322 209 84454	IC, 5 V, MC7805CT 1A TO-220
IC107	5322 492 70235	Spring
IC107	5322 466 61813	Insulating washer, 15X22 CLIP TO220
IC107	5322 130 44843	IC, -5 V, MC7905CT 1A TO-220
IC110	5322 209 71555	IC, PC74HC373T SO-20
IC111	5322 255 40428	IC-socket, 16 pol, DIL
IC111	5322 209 82866	IC, AM687DL
IC112	5322 209 70313	IC, MC10125P
IC113	5322 209 11578	IC, PCF8574T SO-16L
IC114	5322 209 11578	IC, PCF8574T SO-16L
IC115	5322 209 70351	IC, 8 BIT, 7528 DIL20
IC116	5322 209 14481	IC, 4053B SO16
IC117	5322 209 14481	IC, 4053B SO16
IC118	5322 209 71553	IC, NE532D DUAL SO-8
IC119	5322 209 71553	IC, NE532D DUAL SO-8
IC120	5322 209 71553	IC, NE532D DUAL SO-8
IC121	5322 209 71553	IC, NE532D DUAL SO-8

* No stock item.

PM 6666
Basic Board, U1, cont...

POS	SERVICE CODE	DESCRIPTION
IC122	5322 209 84825	IC, MC10216P
IC123	5322 209 86203	IC, MC10138P
IC124	5322 209 82864	IC-ref, 2.50 V, MC1403U DIL-8
IC125	5322 209 14481	IC, 4053B SO16
IC126	5322 209 71553	IC, NE532D DUAL SO-8
JP101	5322 265 60251	Connector, 4 pol, F095 double row
JP101	5322 263 50101	Connector, 2 pol, F095 jumper
P1	5322 290 34064	Flat pin, 2.80 mm, E184/8 LESA SN BAND
P2	5322 290 34064	Flat pin, 2.80 mm, E184/8 LESA SN BAND
R100	5322 116 80427	Resistor, 1 kΩ, 1% 1/8 W 100PPM 1206
R101	5322 116 80427	Resistor, 1 kΩ, 1% 1/8 W 100PPM 1206
R102	5322 116 80427	Resistor, 1 kΩ, 1% 1/8 W 100PPM 1206
R104	5322 116 80447	Resistor, 470 kΩ, 1% 1/8 W 100PPM 1206
R105	5322 116 80447	Resistor, 470 kΩ, 1% 1/8 W 100PPM 1206
R106	5322 116 80429	Resistor, 100 kΩ, 1% 1/8 W 100PPM 1206
R107	5322 116 80436	Resistor, 220 kΩ, 1% 1/8 W 100PPM 1206
R108	5322 116 80448	Resistor, 47 Ω, 1% 1/8 W 100PPM 1206
R109	5322 111 90094	Resistor, 10 MΩ, 10% 1/4 W RC-01 1206
R110	5322 111 90094	Resistor, 10 MΩ, 10% 1/4 W RC-01 1206
R111	5322 116 80431	Resistor, 150 Ω, 1% 1/8 W 100PPM 1206
R112	5322 116 80428	Resistor, 10 kΩ, 1% 1/8 W 100PPM 1206
R113	5322 116 80444	Resistor, 470 Ω, 1% 1/8 W 100PPM 1206
R114	5322 116 80433	Resistor, 220 Ω, 1% 1/8 W 100PPM 1206
R115	5322 116 80426	Resistor, 100 Ω, 1% 1/8 W 100PPM 1206
R116	5322 116 80428	Resistor, 10 kΩ, 1% 1/8 W 100PPM 1206
R117	5322 116 80428	Resistor, 10 kΩ, 1% 1/8 W 100PPM 1206
R118	5322 116 80428	Resistor, 10 kΩ, 1% 1/8 W 100PPM 1206
R119	5322 116 80427	Resistor, 1 kΩ, 1% 1/8 W 100PPM 1206
R120	5322 116 80427	Resistor, 1 kΩ, 1% 1/8 W 100PPM 1206
R121	5322 111 90094	Resistor, 10 MΩ, 10% 1/4 W RC-01 1206
R122	5322 111 90094	Resistor, 10 MΩ, 10% 1/4 W RC-01 1206
R123	5322 116 80447	Resistor, 470 kΩ, 1% 1/8 W 100PPM 1206
R124	5322 116 80448	Resistor, 47 Ω, 1% 1/8 W 100PPM 1206
R125	5322 116 80447	Resistor, 470 kΩ, 1% 1/8 W 100PPM 1206
R126	5322 116 80427	Resistor, 1 kΩ, 1% 1/8 W 100PPM 1206
R127	5322 116 80431	Resistor, 150 Ω, 1% 1/8 W 100PPM 1206
R128	5322 116 80428	Resistor, 10 kΩ, 1% 1/8 W 100PPM 1206
R129	5322 116 80429	Resistor, 100 kΩ, 1% 1/8 W 100PPM 1206
R130	5322 116 80436	Resistor, 220 kΩ, 1% 1/8 W 100PPM 1206
R132	5322 116 80444	Resistor, 470 Ω, 1% 1/8 W 100PPM 1206
R133	5322 116 80426	Resistor, 100 Ω, 1% 1/8 W 100PPM 1206
R134	5322 116 80436	Resistor, 220 kΩ, 1% 1/8 W 100PPM 1206
R135	5322 116 80433	Resistor, 220 Ω, 1% 1/8 W 100PPM 1206
R136	5322 116 80433	Resistor, 220 Ω, 1% 1/8 W 100PPM 1206
R137	5322 116 80436	Resistor, 220 kΩ, 1% 1/8 W 100PPM 1206
R138	5322 116 80436	Resistor, 220 kΩ, 1% 1/8 W 100PPM 1206
R139	5322 100 11143	Potentiometer, 10 kΩ, 25% 1/10 W 3304X-1-103
R140	5322 116 80451	Resistor, 68 kΩ, 1% 1/8 W 100PPM 1206
R141	5322 116 80451	Resistor, 68 kΩ, 1% 1/8 W 100PPM 1206
R142	5322 116 80429	Resistor, 100 kΩ, 1% 1/8 W 100PPM 1206

*No stock item.

PM 6666
Basic Board, U1, cont...

POS	SERVICE CODE	DESCRIPTION
R143	5322 101 10841	Potentiometer, 100 kΩ, 3304X-1-104
R146	5322 116 80449	Resistor, 680 Ω, 1% 1/8 W 100PPM 1206
R147	5322 116 80432	Resistor, 1.50 kΩ, 1% 1/8 W 100PPM 1206
R148	5322 116 80432	Resistor, 1.50 kΩ, 1% 1/8 W 100PPM 1206
R149	5322 116 80428	Resistor, 10 kΩ, 1% 1/8 W 100PPM 1206
R150	5322 116 80428	Resistor, 10 kΩ, 1% 1/8 W 100PPM 1206
R151	5322 116 80447	Resistor, 470 kΩ, 1% 1/8 W 100PPM 1206
R152	5322 116 80447	Resistor, 470 kΩ, 1% 1/8 W 100PPM 1206
R153	5322 116 80447	Resistor, 470 kΩ, 1% 1/8 W 100PPM 1206
R154	5322 116 80445	Resistor, 4.70 kΩ, 1% 1/8 W 100PPM 1206
R155	5322 116 80447	Resistor, 470 kΩ, 1% 1/8 W 100PPM 1206
R156	5322 116 80447	Resistor, 470 kΩ, 1% 1/8 W 100PPM 1206
R157	5322 116 80447	Resistor, 470 kΩ, 1% 1/8 W 100PPM 1206
R158	5322 116 80428	Resistor, 10 kΩ, 1% 1/8 W 100PPM 1206
R159	5322 116 80445	Resistor, 4.70 kΩ, 1% 1/8 W 100PPM 1206
R160	5322 116 51702	Resistor, 10 kΩ, 0.1% 1/4 W MPR24
R161	5322 116 51702	Resistor, 10 kΩ, 0.1% 1/4 W MPR24
R162	5322 116 80445	Resistor, 4.70 kΩ, 1% 1/8 W 100PPM 1206
R166	5322 116 51702	Resistor, 10 kΩ, 0.1% 1/4 W MPR24
R167	5322 116 51702	Resistor, 10 kΩ, 0.1% 1/4 W MPR24
R168	5322 116 80445	Resistor, 4.70 kΩ, 1% 1/8 W 100PPM 1206
R172	5322 116 80445	Resistor, 4.70 kΩ, 1% 1/8 W 100PPM 1206
R173	5322 116 80434	Resistor, 2.20 kΩ, 1% 1/8 W 100PPM 1206
R174	5322 116 80432	Resistor, 1.50 kΩ, 1% 1/8 W 100PPM 1206
R175	5322 116 80433	Resistor, 220 Ω, 1% 1/8 W 100PPM 1206
R176	5322 116 80448	Resistor, 47 Ω, 1% 1/8 W 100PPM 1206
R177	5322 111 90094	Resistor, 10 MΩ, 10% 1/4 W RC-01 1206
R178	5322 116 80438	Resistor, 330 Ω, 1% 1/8 W 100PPM 1206
R179	5322 116 80442	Resistor, 390 Ω, 1% 1/8 W 100PPM 1206
R180	5322 116 80432	Resistor, 1.50 kΩ, 1% 1/8 W 100PPM 1206
R181	5322 116 80426	Resistor, 100 Ω, 1% 1/8 W 100PPM 1206
R182	5322 116 30239	Thermistor, 4.70 kΩ, 5% 1/2 W NTC
R183	5322 116 80438	Resistor, 330 Ω, 1% 1/8 W 100PPM 1206
R184	5322 116 80438	Resistor, 330 Ω, 1% 1/8 W 100PPM 1206
R185	5322 100 11143	Potentiometer, 10 kΩ, 25% 1/10 W 3304X-1-103
R186	5322 116 80429	Resistor, 100 kΩ, 1% 1/8 W 100PPM 1206
R187	5322 116 80451	Resistor, 68 kΩ, 1% 1/8 W 100PPM 1206
R188	5322 101 10841	Potentiometer, 100 kΩ, 3304X-1-104
R189	5322 116 80427	Resistor, 1 kΩ, 1% 1/8 W 100PPM 1206
R190	5322 116 80437	Resistor, 2.70 kΩ, 1% 1/8 W 100PPM 1206
R191	5322 116 80451	Resistor, 68 kΩ, 1% 1/8 W 100PPM 1206
R192	5322 116 80436	Resistor, 220 kΩ, 1% 1/8 W 100PPM 1206
R193	5322 116 80433	Resistor, 220 Ω, 1% 1/8 W 100PPM 1206
R194	5322 116 80428	Resistor, 10 kΩ, 1% 1/8 W 100PPM 1206
R195	5322 116 80448	Resistor, 47 Ω, 1% 1/8 W 100PPM 1206
R196	5322 111 90094	Resistor, 10 MΩ, 10% 1/4 W RC-01 1206
R197	5322 116 80438	Resistor, 330 Ω, 1% 1/8 W 100PPM 1206
R198	5322 116 80428	Resistor, 10 kΩ, 1% 1/8 W 100PPM 1206
R199	5322 116 80433	Resistor, 220 Ω, 1% 1/8 W 100PPM 1206
R200	5322 116 80442	Resistor, 390 Ω, 1% 1/8 W 100PPM 1206

* No stock item.

PM 6666
Basic Board, U1, cont...

POS	SERVICE CODE	DESCRIPTION
R201	5322 116 80432	Resistor, 1.50 kΩ, 1% 1/8 W 100PPM 1206
R202	5322 116 80426	Resistor, 100 Ω, 1% 1/8 W 100PPM 1206
R203	5322 116 30239	Thermistor, 4.70 kΩ, 5% 1/2 W NTC
R204	5322 116 80438	Resistor, 330 Ω, 1% 1/8 W 100PPM 1206
R205	5322 116 80438	Resistor, 330 Ω, 1% 1/8 W 100PPM 1206
R206	5322 116 80427	Resistor, 1 kΩ, 1% 1/8 W 100PPM 1206
R207	5322 116 80427	Resistor, 1 kΩ, 1% 1/8 W 100PPM 1206
R208	5322 116 80438	Resistor, 330 Ω, 1% 1/8 W 100PPM 1206
R209	5322 116 80444	Resistor, 470 Ω, 1% 1/8 W 100PPM 1206
R210	5322 116 80427	Resistor, 1 kΩ, 1% 1/8 W 100PPM 1206
R211	5322 116 80444	Resistor, 470 Ω, 1% 1/8 W 100PPM 1206
R212	5322 116 80427	Resistor, 1 kΩ, 1% 1/8 W 100PPM 1206
R213	5322 116 80438	Resistor, 330 Ω, 1% 1/8 W 100PPM 1206
R214	5322 116 80428	Resistor, 10 kΩ, 1% 1/8 W 100PPM 1206
R215	5322 111 90242	Resistor, 180 Ω, 1% 1/8 W 100PPM 1206
R217	5322 100 11143	Potentiometer, 10 kΩ, 25% 1/10 W 3304X-1-103
R218	5322 116 80444	Resistor, 470 Ω, 1% 1/8 W 100PPM 1206
R219	5322 116 80427	Resistor, 1 kΩ, 1% 1/8 W 100PPM 1206
R220	5322 116 80427	Resistor, 1 kΩ, 1% 1/8 W 100PPM 1206
R221	5322 116 80444	Resistor, 470 Ω, 1% 1/8 W 100PPM 1206
R222	5322 116 80444	Resistor, 470 Ω, 1% 1/8 W 100PPM 1206
R223	5322 116 80444	Resistor, 470 Ω, 1% 1/8 W 100PPM 1206
R224	5322 116 80427	Resistor, 1 kΩ, 1% 1/8 W 100PPM 1206
R225	5322 116 80437	Resistor, 2.70 kΩ, 1% 1/8 W 100PPM 1206
R226	5322 116 80436	Resistor, 220 kΩ, 1% 1/8 W 100PPM 1206
R227	5322 116 80441	Resistor, 33 kΩ, 1% 1/8 W 100PPM 1206
R230	5322 116 80441	Resistor, 33 kΩ, 1% 1/8 W 100PPM 1206
R231	5322 116 80436	Resistor, 220 kΩ, 1% 1/8 W 100PPM 1206
R234	5322 116 80429	Resistor, 100 kΩ, 1% 1/8 W 100PPM 1206
R235	5322 116 80446	Resistor, 47 kΩ, 1% 1/8 W 100PPM 1206
R236	5322 116 80446	Resistor, 47 kΩ, 1% 1/8 W 100PPM 1206
R237	5322 116 80429	Resistor, 100 kΩ, 1% 1/8 W 100PPM 1206
R238	5322 116 80446	Resistor, 47 kΩ, 1% 1/8 W 100PPM 1206
R239	5322 116 80446	Resistor, 47 kΩ, 1% 1/8 W 100PPM 1206
R240	5322 116 80448	Resistor, 47 Ω, 1% 1/8 W 100PPM 1206
R241	5322 116 80426	Resistor, 100 Ω, 1% 1/8 W 100PPM 1206
R242	5322 116 80448	Resistor, 47 Ω, 1% 1/8 W 100PPM 1206
R243	5322 116 80426	Resistor, 100 Ω, 1% 1/8 W 100PPM 1206
R244	5322 116 80426	Resistor, 100 Ω, 1% 1/8 W 100PPM 1206
R250	5322 116 80428	Resistor, 10 kΩ, 1% 1/8 W 100PPM 1206
R251	5322 116 80429	Resistor, 100 kΩ, 1% 1/8 W 100PPM 1206
R252	5322 116 80428	Resistor, 10 kΩ, 1% 1/8 W 100PPM 1206
R253	5322 116 80429	Resistor, 100 kΩ, 1% 1/8 W 100PPM 1206
R254	5322 116 80429	Resistor, 100 kΩ, 1% 1/8 W 100PPM 1206
R255	5322 116 80429	Resistor, 100 kΩ, 1% 1/8 W 100PPM 1206
R256	5322 116 80429	Resistor, 100 kΩ, 1% 1/8 W 100PPM 1206
R257	5322 116 80429	Resistor, 100 kΩ, 1% 1/8 W 100PPM 1206
R258	5322 116 80441	Resistor, 33 kΩ, 1% 1/8 W 100PPM 1206
R259	5322 116 80441	Resistor, 33 kΩ, 1% 1/8 W 100PPM 1206
R260	5322 116 80441	Resistor, 33 kΩ, 1% 1/8 W 100PPM 1206

* No stock item.

PM 6666
Basic Board, U1, cont...

POS	SERVICE CODE	DESCRIPTION
R261	5322 100 11143	Potentiometer, 10 kΩ, 25% 1/10 W 3304X-1-103
R262	5322 100 11143	Potentiometer, 10 kΩ, 25% 1/10 W 3304X-1-103
R263	5322 100 11143	Potentiometer, 10 kΩ, 25% 1/10 W 3304X-1-103
R266	5322 116 80444	Resistor, 470 Ω, 1% 1/8 W 100PPM 1206
R267	5322 116 80444	Resistor, 470 Ω, 1% 1/8 W 100PPM 1206
RE101	5322 280 20144	Reed relay, 5 V, HE321A0400
RE102	5322 280 20144	Reed relay, 5 V, HE321A0400
RE103	5322 280 70332	Relay, 5 V, SY-5K 1-pol VXL
RE104	5322 280 70332	Relay, 5 V, SY-5K 1-pol VXL
RE105	5322 280 70332	Relay, 5 V, SY-5K 1-pol VXL
SK103	5322 414 20031	Push button, VKS, 6.5X6.5 L-BR 30304
SK103	4822 276 11076	Key switch, 1 pol, DW-5112 TYPE VKS
SK104	5322 277 21124	Voltage switch, V202-12-MA-08-Q
SK106	5322 414 20033	Push button, SCHAD, 6X10 M-BR 30304 ALPS
SK106	5322 276 12192	Push switch, 1 cell
TP100	5322 265 60251	Connector, 4 pol, F095 double row
TR101	5322 146 21229	Transformer
TS100	5322 130 60845	Transistor, 0.5 A, BC807-25 45V SOT23
TS101	5322 130 60845	Transistor, 0.5 A, BC807-25 45V SOT23
TS102	5322 130 60845	Transistor, 0.5 A, BC807-25 45V SOT23
TS103	5322 130 40781	Transistor, BFS17 .05A 15V SOT23
TS104	5322 130 44787	Transistor, BFR31 .01A 25V SOT23
TS105	5322 130 40781	Transistor, BFS17 .05A 15V SOT23
TS106	5322 130 40781	Transistor, BFS17 .05A 15V SOT23
TS107	5322 130 44787	Transistor, BFR31 .01A 25V SOT23
TS108	5322 130 40781	Transistor, BFS17 .05A 15V SOT23
TS109	5322 130 40781	Transistor, BFS17 .05A 15V SOT23
TS110	5322 130 40781	Transistor, BFS17 .05A 15V SOT23

* No stock item.

PM 6666
Key Board, U5

POS	SERVICE CODE	DESCRIPTION
BU501	5322 321 22566	Flat cable, 50 mm, 16-pol
C501	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
GR501	5322 130 30691	Diode, 0.25 A, BAW56 70V SOT23
GR502	5322 130 30691	Diode, 0.25 A, BAW56 70V SOT23
GR504	5322 130 30691	Diode, 0.25 A, BAW56 70V SOT23
GR505	5322 130 30691	Diode, 0.25 A, BAW56 70V SOT23
GR507	5322 130 30691	Diode, 0.25 A, BAW56 70V SOT23
GR508	5322 130 30691	Diode, 0.25 A, BAW56 70V SOT23
GR510	5322 130 30691	Diode, 0.25 A, BAW56 70V SOT23
IC501	5322 209 11578	IC, PCF8574T SO-16L
R501	4822 111 90339	Resistor, 120 Ω, 1% 1/8 W 100PPM 1206
R502	4822 111 90339	Resistor, 120 Ω, 1% 1/8 W 100PPM 1206
R503	4822 111 90339	Resistor, 120 Ω, 1% 1/8 W 100PPM 1206
R504	4822 111 90154	Resistor, 270 Ω, 1% 1/8 W 100PPM 1206
R505	4822 111 90339	Resistor, 120 Ω, 1% 1/8 W 100PPM 1206
R506	4822 111 90339	Resistor, 120 Ω, 1% 1/8 W 100PPM 1206
R507	4822 111 90339	Resistor, 120 Ω, 1% 1/8 W 100PPM 1206
R508	4822 111 90154	Resistor, 270 Ω, 1% 1/8 W 100PPM 1206
SK501	5322 414 60038	Push button, PREH, 6.5X6.5 L-BR 30304 L
SK501	5322 276 11448	Push switch, 1 pol, LED green
SK502	5322 414 60038	Push button, PREH, 6.5X6.5 L-BR 30304 L
SK502	5322 276 11448	Push switch, 1 pol, LED green
SK503	5322 414 60038	Push button, PREH, 6.5X6.5 L-BR 30304 L
SK503	5322 276 11448	Push switch, 1 pol, LED green
SK504	5322 414 60038	Push button, PREH, 6.5X6.5 L-BR 30304 L
SK504	5322 276 11448	Push switch, 1 pol, LED green
SK505	5322 414 60036	Push button, PREH, 6.5X6.5 L-BR 30304
SK505	5322 276 14404	Push switch, 75120-002 SW
SK506	5322 414 60036	Push button, PREH, 6.5X6.5 L-BR 30304
SK506	5322 276 14404	Push switch, 75120-002 SW
SK507	5322 414 60038	Push button, PREH, 6.5X6.5 L-BR 30304 L
SK507	5322 276 11448	Push switch, 1 pol, LED green
SK508	5322 414 60038	Push button, PREH, 6.5X6.5 L-BR 30304 L
SK508	5322 276 11446	Push switch, 1 pol, 75120-050 LED red
SK509	5322 414 60038	Push button, PREH, 6.5X6.5 L-BR 30304 L
SK509	5322 276 11446	Push switch, 1 pol, 75120-050 LED red
SK510	5322 414 60038	Push button, PREH, 6.5X6.5 L-BR 30304 L
SK510	5322 276 11448	Push switch, 1 pol, LED green

*No stock item.

PM 6665 & PM 6666 Front Panel, U2

POS	SERVICE CODE	DESCRIPTION
BU201	5322 267 50336	Connector, 10 pol, 22-14-2104 4455-BC
C201	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
GR201	5322 130 30691	Diode, 0.25 A, BAW56 70V SOT23
GR203	5322 130 30691	Diode, 0.25 A, BAW56 70V SOT23
GR204	5322 130 30691	Diode, 0.25 A, BAW56 70V SOT23
IC201	5322 209 11129	IC, PCF8576T VSO56
R201	5322 116 80429	Resistor, 100 kΩ, 1% 1/8 W 100PPM 1206
SK201	5322 414 20031	Push button, VKS, 6.5X6.5 L-BR 30304
SK201	4822 276 11076	Key switch, 1 pol, DW-5112 TYPE VKS
SK202	5322 414 20031	Push button, VKS, 6.5X6.5 L-BR 30304
SK202	4822 276 11076	Key switch, 1 pol, DW-5112 TYPE VKS
SK203	5322 414 60146	Push button, VKS, 6.5X6.5 BEIGE 40317
SK203	4822 276 11076	Key switch, 1 pol, DW-5112 TYPE VKS
SK204	5322 414 20031	Push button, VKS, 6.5X6.5 L-BR 30304
SK204	4822 276 11076	Key switch, 1 pol, DW-5112 TYPE VKS
SK205	5322 414 20031	Push button, VKS, 6.5X6.5 L-BR 30304
SK205	4822 276 11076	Key switch, 1 pol, DW-5112 TYPE VKS

PM 6665 & PM 6666 Crystal Oscillator, U4

POS	SERVICE CODE	DESCRIPTION
BU404	5322 267 54195	Connector, 10 pol, 22-15-2106 4455-AC
C401	4822 122 31414	Capacitor, 10 nF, -20/+50% 100 V 2M
C402	4822 122 31237	Capacitor, 82 pF, 2% 100 V NPO 2M
C403	5322 125 54029	Capacitor, 2-18 pF, 300 V
C404	4822 122 31063	Capacitor, 22 pF, 2% 100 V NPO 2M
C405	4822 122 31237	Capacitor, 82 pF, 2% 100 V NPO 2M
IC401	5322 209 11455	IC, MM74HCU04N
KT401	5322 242 74163	Crystal, 10 MHz, HC-49U
R401	5322 116 55535	Resistor, 1 MΩ, 1% 0.4 WMR25
R402	5322 116 55274	Resistor, 215 Ω, 1% 0.4 W MR25
R403	4822 116 53108	Resistor, 1 kΩ, 1% 0.5 W MRS25
R404	4822 116 53022	Resistor, 10 kΩ, 1% 0.5 W MRS25

* No stock item.

PM 9604 GPIB Interface

POS	SERVICE CODE	DESCRIPTION
	4822 530 80173*	Spring washer, KBA 3.2 ST FZ DIN137
	4822 530 80082*	Lock washer, YT3.2 ST FZ DIN6798A
	4822 502 11474*	Screw, MRXTT 3X10 ST FZ POZ
	4822 502 11473*	Screw, MRXTT 3X8 ST FZ POZ
	5322 535 92884*	Spacer, 19.10 mm, KGLS-12S
	5322 401 11252*	Bracket
	5322 401 11257*	Clamp, TO220
	5322 466 61813*	Insulating washer, 15X22 CLIP TO220
BU101	5322 267 60148	Connector, 24 pol, 57LE-20240-77OOD35G
BU102	5322 321 22315	Cable assy, 130 mm, 10-pol
C1	5322 124 14075	Capacitor, 1 µF, 20% 40V (25V) SOL AL
C2	5322 121 42525	Capacitor, 470 nF, 10% 63V MMKO-5 PETP
C3	5322 121 42525	Capacitor, 470 nF, 10% 63V MMKO-5 PETP
C4	4822 122 31414	Capacitor, 10 nF, -20/+50% 100V 2M
C5	4822 122 31414	Capacitor, 10 nF, -20/+50% 100V 2M
C6	4822 122 31414	Capacitor, 10 nF, -20/+50% 100V 2M
GR1	4822 130 30621	Diode, 0.20 A, 1N4148/75 DO-35
IC1	5322 255 40233	IC-socket, 40 pol, DIL
IC1	5322 209 81264	IC, P8291A TALK/LISTEN
IC2	5322 209 51434	IC-microp, PM9604 MAB8461
IC2	5322 255 40234	IC-socket, 28 pol, DIL
IC3	5322 209 81842	IC, SN75161AN
IC4	5322 209 81807	IC, SN75160AN
IC5	4822 209 10317	IC, HEF40097BP
IC6	5322 209 84841	IC, 5 V, MC7805CT 1A TO-220
R1	5322 111 94031	Res.Network, 47 kΩ, 10%X6 1/8W
R8	5322 116 53232	Resistor, 464 Ω, 1% 1/2W MRS25
SW1	5322 277 21125	DIP Switch, 6 pol, 206-6 RAST
TS1	4822 130 40824	Transistor, BD136 1.5A 45V TO126

PM 9605 Battery Unit

POS	SERVICE CODE	DESCRIPTION
	4822 530 80173*	Spring washer, KBA 3.2 ST FZ DIN137
	4822 502 11835*	Screw, MRXTT 3X6 ST FZ POZ
	4822 502 11474*	Screw, MRXTT 3X10 ST FZ POZ
	4822 502 11473*	Screw, MRXTT 3X8 ST FZ POZ
	5322 321 22315	Cable assy, 130 mm, 10-pol
	5322 218 70098*	PC-B assy
	5322 321 23322	Cable set
	5322 447 91679*	Holder
	5322 401 11253*	Bracket
	5322 401 11254*	Clamp
	5322 535 92885*	Distance nut
	5322 401 11255*	Clamp washer
	5322 466 61812*	Insulating washer
C10	5322 124 10687	Capacitor, 6.80 µF, 20% 16V 6.0X3.2 MOLD
C11	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R0805

* No stock item.

PM 9605
Battery Unit, cont...

POS	SERVICE CODE	DESCRIPTION
C20	5322 124 10686	Capacitor, 1 µF, 20% 16V 3.2X1.6 MOLD
C21	4822 122 33496	Capacitor, 100 nF, 10% 63V X7R1206
C30	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R0805
C31	5322 124 10686	Capacitor, 1 µF, 20% 16V 3.2X1.6 MOLD
C32	5322 124 10685	Capacitor, 2.20 µF, 20%6.3V 3.2X1.6 MOLD
C41	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R0805
C42	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R0805
C45	4822 124 40963	Capacitor, 33 µF, 20% 10VSOLID AL
C46	4822 124 40729	Capacitor, 2200 µF, 20% 6.3V RADIAL 2M
C47	4822 122 33496	Capacitor, 100 nF, 10% 63V X7R1206
C48	4822 122 33496	Capacitor, 100 nF, 10% 63V X7R1206
C49	4822 124 40963	Capacitor, 33 µF, 20% 10VSOLID AL
C50	4822 124 40963	Capacitor, 33 µF, 20% 10VSOLID AL
C51	5322 124 10455	Capacitor, 68 µF, 20% 6.3VSOLID AL
C52	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R0805
GR1	4822 130 31982	Diode, 2 A, BYV27-100
GR13	5322 130 33671	Diode, 0.35 W, BZX84-C6V2SOT23
GR2	5322 130 80214	Diode, 0.25 A, BAS2875VSOT143
GR3	5322 130 80214	Diode, 0.25 A, BAS2875VSOT143
GR4	5322 130 80214	Diode, 0.25 A, BAS2875VSOT143
GR7	4822 130 31982	Diode, 2 A, BYV27-100
GR9	5322 130 80214	Diode, 0.25 A, BAS2875VSOT143
IC1	5322 209 86513	IC, UA78S40PC
IC2	5322 209 71553	IC, NE532D DUALSO-8
IC3	5322 209 71553	IC, NE532D DUALSO-8
IC4	4822 209 81397	IC, TL431C-LPTO92
IC5	5322 209 72487	IC, 5 V, LM2940CT-5.0TO-220
L1	5322 157 53239	Choke
L2	5322 158 10311	Choke, 1 µH, 10% Q=44 1641-102
L3	5322 158 10311	Choke, 1 µH, 10% Q=44 1641-102
P1	5322 290 34064	Flat pin, 2.80 mm, E184/8 LESA SNBAND
P2	5322 290 34064	Flat pin, 2.80 mm, E184/8 LESA SNBAND
PT1	5322 100 11143	Potentiometer, 10 kΩ, 25% 0.1W 3304X-1-103
PT2	5322 100 11144	Potentiometer, 500 Ω, 25% 0.1W Cermet
PT3	5322 100 11143	Potentiometer, 10 kΩ, 25% 0.1W 3304X-1-103
PT4	5322 100 11144	Potentiometer, 500 Ω, 25% 0.1W Cermet
R1	5322 116 53071	Resistor, 0.22 Ω, SN14L2EJ 0.22 Ω 5%
R10	5322 116 80427	Resistor, 1 kΩ, 1% 1/8W 100 ppm 1206
R12	5322 116 80428	Resistor, 10 kΩ, 1% 1/8W 100 ppm 1206
R13	5322 116 80443	Resistor, 3.90 kΩ, 1% 1/8W 100 ppm 1206
R14	5322 116 80435	Resistor, 22 kΩ, 1% 1/8W 100 ppm 1206
R15	5322 116 80428	Resistor, 10 kΩ, 1% 1/8W 100 ppm 1206
R19	5322 116 30239	Thermistor, 4.70 kΩ, 5% 1/2W NTC
R2	5322 116 80429	Resistor, 100 kΩ, 1% 1/8W 100 ppm 1206
R20	5322 116 80438	Resistor, 330 Ω, 1% 1/8W 100 ppm 1206
R23	5322 116 80434	Resistor, 2.20 kΩ, 1% 1/8W 100 ppm 1206
R24	5322 116 80446	Resistor, 47 kΩ, 1% 1/8W 100 ppm 1206
R25	5322 116 80434	Resistor, 2.20 kΩ, 1% 1/8W 100 ppm 1206
R27	5322 116 80441	Resistor, 33 kΩ, 1% 1/8W 100 ppm 1206
R3	5322 116 80429	Resistor, 100 kΩ, 1% 1/8W 100 ppm 1206

* No stock item.

PM 9605
Battery Unit, cont...

POS	SERVICE CODE	DESCRIPTION
R30	5322 116 80428	Resistor, 10 kΩ, 1% 1/8W 100 ppm 1206
R31	5322 116 80441	Resistor, 33 kΩ, 1% 1/8W 100 ppm 1206
R33	5322 116 80446	Resistor, 47 kΩ, 1% 1/8W 100 ppm 1206
R34	5322 116 80434	Resistor, 2.20 kΩ, 1% 1/8W 100 ppm 1206
R36	5322 116 80434	Resistor, 2.20 kΩ, 1% 1/8W 100 ppm 1206
R37	5322 116 80439	Resistor, 3.30 kΩ, 1% 1/8W 100 ppm 1206
R4	5322 116 80429	Resistor, 100 kΩ, 1% 1/8W 100 ppm 1206
R40	5322 116 53071	Resistor, 0.22 Ω, SN14L2EJ 0.22 Ω 5%
R41	5322 116 80428	Resistor, 10 kΩ, 1% 1/8W 100 ppm 1206
R42	5322 116 80426	Resistor, 100 Ω, 1% 1/8W 100 ppm 1206
R43	5322 116 80427	Resistor, 1 kΩ, 1% 1/8W 100 ppm 1206
R45	5322 116 80441	Resistor, 33 kΩ, 1% 1/8W 100 ppm 1206
R47	5322 116 80426	Resistor, 100 Ω, 1% 1/8W 100 ppm 1206
R48	5322 116 80434	Resistor, 2.20 kΩ, 1% 1/8W 100 ppm 1206
R5	5322 116 80429	Resistor, 100 kΩ, 1% 1/8W 100 ppm 1206
R50	5322 116 80433	Resistor, 220 Ω, 1% 1/8W 100 ppm 1206
R52	5322 116 80448	Resistor, 47 Ω, 1% 1/8W 100 ppm 1206
R6	5322 116 80431	Resistor, 150 Ω, 1% 1/8W 100 ppm 1206
R7	5322 116 80427	Resistor, 1 kΩ, 1% 1/8W 100 ppm 1206
R9	5322 116 80428	Resistor, 10 kΩ, 1% 1/8W 100 ppm 1206
RE1	5322 280 70332	Relay, 5 V, SY-5K1-pol VXL
RE2	5322 280 70332	Relay, 5 V, SY-5K1-pol VXL
TS1	5322 130 44324	Transistor, BD204 8A 60V TO220
TS2	5322 130 60508	Transistor, BC857B 0.1A 45V SOT23
TS4	5322 130 60508	Transistor, BC857B 0.1A 45V SOT23
TS5	4822 130 60511	Transistor, BC847B 0.1A 45V SOT23
TS6	4822 130 60511	Transistor, BC847B 0.1A 45V SOT23
TS7	4822 130 60511	Transistor, BC847B 0.1A 45V SOT23
TS9	5322 130 40753	Transistor, BD132 6A 45V TO126
VL1	4822 253 30024	Fuse, 1.60 A, 5X20 T nFST034.3119
VL1	5322 256 30401	Fuse holder, UHB 031.5101 5X20MM

* No stock item.

PM 9608
1.1 GHz HF Input

POS	SERVICE CODE	DESCRIPTION
	5322 321 22313	Cable assy
	5322 447 91672*	Shield
	5322 447 91673*	Shield cover
BU301	5322 267 60199	Connector, R 114426 SMB
BU302	5322 290 30191	Soldering pin, 2.80 mm, E242.5 SN
BU303	5322 267 54195	Connector, 10 pol, 22-15-2106 4455-AC
BU304	5322 290 30191	Soldering pin, 2.80 mm, E242.5 SN
C301	5322 122 32532	Capacitor, 100 pF, 5% 50V NP0 0805
C302	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C303	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C304	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R 0805
C304	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C305	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C306	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C307	5322 122 32452	Capacitor, 47 pF, 5% 50V NP0 0805
C308	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C310	5322 122 32287	Capacitor, 4.70 pF, 5% 50V NP0 0805
C310	5322 122 32451	Capacitor, 4.70 pF, 5% 50V NP0 0805
C311	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C312	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C313	5322 122 32448	Capacitor, 10 pF, 5% 50V NP0 0805
C314	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C316	5322 122 33063	Capacitor, 2.20 pF, 5% 50V NP0 0805
C317	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C318	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R 0805
C318	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C319	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R 0805
C319	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C320	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R 0805
C320	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C321	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R 0805
C321	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C322	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R 0805
C322	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C323	5322 122 32446	Capacitor, 470 nF, 20% 50V X7R 2220
C324	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C325	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R 0805
C325	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C326	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R 0805
C326	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
C327	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R 0805
C327	5322 122 32453	Capacitor, 10 nF, 20% 50V X7R 0805
GR303	5322 130 31544	Diode, 0.03 A, BAT17 SOT23
GR304	5322 130 31544	Diode, 0.03 A, BAT17 SOT23
GR305	5322 130 31544	Diode, 0.03 A, BAT17 SOT23
GR306	5322 130 31544	Diode, 0.03 A, BAT17 SOT23
GR307	5322 130 31544	Diode, 0.03 A, BAT17 SOT23
GR308	5322 130 34337	Diode, 0.10 A, BAV99 SOT23
GR309	5322 130 31544	Diode, 0.03 A, BAT17 SOT23
GR311	5322 130 80246	Diode, BAR 16-1 SOT23

* No stock item.

PM 9608
1.1 GHz HF Input, cont...

POS	SERVICE CODE	DESCRIPTION
GR313	5322 130 34337	Diode, 0.10 A, BAV99 SOT23
IC301	5322 209 71557	IC, UPC1652G SO-8
IC302	5322 209 60756	IC, SAB1256P /256 DIL-8, Selected
IC303	5322 209 71553	IC, NE532D DUAL SO-8
L301	5322 157 52689	Choke, 0.10 µH, 10% MLnF3216DR10K
L307	5322 157 52689	Choke, 0.10 µH, 10% MLnF3216DR10K
R301	5322 111 90109	Resistor, 470 Ω, 5% 1/4W RC-01 1206
R301	5322 116 80444	Resistor, 470 Ω, 1% 1/8W 100 ppm 1206
R302	5322 111 90109	Resistor, 470 Ω, 5% 1/4W RC-01 1206
R302	5322 116 80444	Resistor, 470 Ω, 1% 1/8W 100 ppm 1206
R303	5322 111 90109	Resistor, 470 Ω, 5% 1/4W RC-01 1206
R303	5322 116 80444	Resistor, 470 Ω, 1% 1/8W 100 ppm 1206
R304	4822 111 90186	Resistor, 22 Ω, 5% 1/4W RC-01 1206
R304	4822 111 90186	Resistor, 22 Ω, 1% 1/8W 100 ppm 1206
R305	4822 111 90186	Resistor, 22 Ω, 5% 1/4W RC-01 1206
R305	4822 111 90186	Resistor, 22 Ω, 1% 1/8W 100 ppm 1206
R306	4822 111 90186	Resistor, 22 Ω, 5% 1/4W RC-01 1206
R306	4822 111 90186	Resistor, 22 Ω, 1% 1/8W 100 ppm 1206
R307	4822 111 90186	Resistor, 22 Ω, 5% 1/4W RC-01 1206
R307	4822 111 90186	Resistor, 22 Ω, 1% 1/8W 100 ppm 1206
R308	4822 111 90186	Resistor, 22 Ω, 5% 1/4W RC-01 1206
R308	4822 111 90186	Resistor, 22 Ω, 1% 1/8W 100 ppm 1206
R309	4822 111 90186	Resistor, 22 Ω, 5% 1/4W RC-01 1206
R309	4822 111 90186	Resistor, 22 Ω, 1% 1/8W 100 ppm 1206
R310	4822 111 90154	Resistor, 270 Ω, 5% 1/4W RC-01 1206
R310	4822 111 90154	Resistor, 270 Ω, 1% 1/8W 100 ppm 1206
R311	5322 111 90106	Resistor, 330 Ω, 5% 1/4W RC-01 1206
R311	5322 116 80438	Resistor, 330 Ω, 1% 1/8W 100 ppm 1206
R312	5322 111 90106	Resistor, 330 Ω, 5% 1/4W RC-01 1206
R312	5322 116 80438	Resistor, 330 Ω, 1% 1/8W 100 ppm 1206
R313	4822 111 90397	Resistor, 8.20 Ω, 10% 1/4W RC-01 1206
R313	4822 111 90397	Resistor, 8.20 Ω, 10% 1/4W RC-01 1206
R314	5322 111 90098	Resistor, 150 Ω, 5% 1/4W RC-01 1206
R314	5322 116 80431	Resistor, 150 Ω, 1% 1/8W 100 ppm 1206
R315	4822 111 90397	Resistor, 8.20 Ω, 10% 1/4W RC-01 1206
R316	4822 111 90178	Resistor, 220 Ω, 5% 1/4W RC-01 1206
R316	5322 116 80433	Resistor, 220 Ω, 1% 1/8W 100 ppm 1206
R319	4822 111 90217	Resistor, 47 Ω, 5% 1/4W RC-01 1206
R319	5322 116 80448	Resistor, 47 Ω, 1% 1/8W 100 ppm 1206
R320	5322 111 90095	Resistor, 10 Ω, 5% 1/4W RC-01 1206
R320	5322 111 90095	Resistor, 10 Ω, 1% 1/8W 100 ppm 1206
R321	4822 111 90217	Resistor, 47 Ω, 5% 1/4W RC-01 1206
R321	5322 116 80448	Resistor, 47 Ω, 1% 1/8W 100 ppm 1206
R322	4822 111 90217	Resistor, 47 Ω, 5% 1/4W RC-01 1206
R322	5322 116 80448	Resistor, 47 Ω, 1% 1/8W 100 ppm 1206
R324	5322 111 90091	Resistor, 100 Ω, 5% 1/4W RC-01 1206
R324	5322 116 80426	Resistor, 100 Ω, 1% 1/8W 100 ppm 1206
R325	4822 111 90569	Resistor, 2.70 kΩ, 5% 1/4W RC-01 1206
R325	5322 116 80437	Resistor, 2.70 kΩ, 1% 1/8W 100 ppm 1206
R326	4822 111 90543	Resistor, 47 kΩ, 5% 1/4W RC-01 1206

*No stock item.

PM 9608
1.1 GHz HF Input, cont...

POS	SERVICE CODE	DESCRIPTION
R326	5322 116 80446	Resistor, 47 kΩ, 1% 1/8W 100 ppm 1206
R327	4822 111 90248	Resistor, 2.20 kΩ, 5% 1/4W RC-01 1206
R327	5322 116 80434	Resistor, 2.20 kΩ, 1% 1/8W 100 ppm 1206
R328	4822 111 90154	Resistor, 270 Ω, 5% 1/4W RC-01 1206
R328	4822 111 90154	Resistor, 270 Ω, 1% 1/8W 100 ppm 1206
R329	5322 111 90106	Resistor, 330 Ω, 5% 1/4W RC-01 1206
R329	5322 116 80438	Resistor, 330 Ω, 1% 1/8W 100 ppm 1206
R330	5322 101 14299	Potentiometer, 1 kΩ, 10% 72X
R331	4822 111 90543	Resistor, 47 kΩ, 5% 1/4W RC-01 1206
R331	5322 116 80446	Resistor, 47 kΩ, 1% 1/8W 100 ppm 1206
R332	5322 111 90111	Resistor, 4.70 kΩ, 5% 1/4W RC-01 1206
R332	5322 116 80445	Resistor, 4.70 kΩ, 1% 1/8W 100 ppm 1206
R333	4822 111 90157	Resistor, 3.30 kΩ, 5% 1/4W RC-01 1206
R333	5322 116 80439	Resistor, 3.30 kΩ, 1% 1/8W 100 ppm 1206
R335	4822 111 90214	Resistor, 100 kΩ, 5% 1/4W RC-01 1206
R335	5322 116 80429	Resistor, 100 kΩ, 1% 1/8W 100 ppm 1206
R336	5322 111 90111	Resistor, 4.70 kΩ, 5% 1/4W RC-01 1206
R336	5322 116 80445	Resistor, 4.70 kΩ, 1% 1/8W 100 ppm 1206
R337	4822 111 90157	Resistor, 3.30 kΩ, 5% 1/4W RC-01 1206
R337	5322 116 80439	Resistor, 3.30 kΩ, 1% 1/8W 100 ppm 1206
R338	5322 111 90111	Resistor, 4.70 kΩ, 5% 1/4W RC-01 1206
R338	5322 116 80445	Resistor, 4.70 kΩ, 1% 1/8W 100 ppm 1206
R339	4822 111 90157	Resistor, 3.30 kΩ, 5% 1/4W RC-01 1206
R339	5322 116 80439	Resistor, 3.30 kΩ, 1% 1/8W 100 ppm 1206
R340	5322 111 90267	Resistor, 33 kΩ, 5% 1/4W RC-01 1206
R340	5322 116 80441	Resistor, 33 kΩ, 1% 1/8W 100 ppm 1206
R341	5322 111 90111	Resistor, 4.70 kΩ, 5% 1/4W RC-01 1206
R341	5322 116 80445	Resistor, 4.70 kΩ, 1% 1/8W 100 ppm 1206
R342	5322 111 90092	Resistor, 1 kΩ, 5% 1/4W RC-01 1206
R342	5322 116 80427	Resistor, 1 kΩ, 1% 1/8W 100 ppm 1206
R343	5322 111 90113	Resistor, 560 Ω, 5% 1/4W RC-01 1206
R343	5322 111 90113	Resistor, 560 Ω, 1% 1/8W 100 ppm 1206
R344	5322 111 90091	Resistor, 100 Ω, 5% 1/4W RC-01 1206
R344	5322 116 80426	Resistor, 100 Ω, 1% 1/8W 100 ppm 1206
R345	5322 111 90376	Resistor, 4.70 Ω, 10% 1/4W RC-01 1206
R345	5322 111 90376	Resistor, 4.70 Ω, 10% 1/4W RC-01 1206
R347	5322 111 90109	Resistor, 470 Ω, 5% 1/4W RC-01 1206
R347	5322 116 80444	Resistor, 470 Ω, 1% 1/8W 100 ppm 1206
R348	4822 111 90339	Resistor, 120 Ω, 1% 1/8W 100 ppm 1206
R349	4822 111 90569	Resistor, 2.70 kΩ, 5% 1/4W RC-01 1206
R349	5322 116 80437	Resistor, 2.70 kΩ, 1% 1/8W 100 ppm 1206
R350	4822 111 90569	Resistor, 2.70 kΩ, 5% 1/4W RC-01 1206
R350	5322 116 80437	Resistor, 2.70 kΩ, 1% 1/8W 100 ppm 1206
R351	5322 111 90267	Resistor, 33 kΩ, 5% 1/4W RC-01 1206
R351	5322 116 80441	Resistor, 33 kΩ, 1% 1/8W 100 ppm 1206
R352	5322 111 90111	Resistor, 4.70 kΩ, 5% 1/4W RC-01 1206
R352	5322 116 80445	Resistor, 4.70 kΩ, 1% 1/8W 100 ppm 1206
R353	4822 111 90249	Resistor, 10 kΩ, 5% 1/4W RC-01 1206
R353	5322 116 80428	Resistor, 10 kΩ, 1% 1/8W 100 ppm 1206
R354	5322 111 90376	Resistor, 4.70 Ω, 10% 1/4W RC-01 1206

* No stock item.

PM 9608
1.1 GHz HF Input, cont...

POS	SERVICE CODE	DESCRIPTION
R354	5322 111 90376	Resistor, 4.70 Ω, 10% 1/4W RC-01 1206
TS301	5322 130 42567	Transistor, BFQ67 SOT23
TS302	5322 130 42567	Transistor, BFQ67 SOT23
TS303	4822 130 60511	Transistor, BC847B 0.1A 45V SOT23
TS304	4822 130 60511	Transistor, BC847B 0.1A 45V SOT23
TS305	5322 130 60508	Transistor, BC857B 0.1A 45V SOT23
TS306	5322 130 60508	Transistor, BC857B 0.1A 45V SOT23

PM 9608B
1.3 GHz HF Input

POS	SERVICE CODE	DESCRIPTION
	5322 321 22313	Cable assy
	5322 447 91672*	Shield
	5322 447 91673*	Shield cover
	5322 401 11256*	Cable clip
BU301	5322 267 60199	Connector, R 114426 SMB
BU302	5322 290 34064	Flat pin, 2.80 mm, E184/8 LESA SN BAND
BU303	5322 267 54195	Connector, 10 pol, 22-15-2106 4455-AC
BU304	5322 290 34064	Flat pin, 2.80 mm, E184/8 LESA SN BAND
C301	5322 122 32532	Capacitor, 100 pF, 5% 50V NP0 0805
C302	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C303	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C304	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R 0805
C305	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C306	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C307	5322 122 32452	Capacitor, 47 pF, 5% 50V NP0 0805
C308	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C310	5322 122 32287	Capacitor, 4.70 pF, 5% 50V NP0 0805
C311	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C312	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C313	5322 122 32481	Capacitor, 15 pF, 5% 50V NP0 0805
C314	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C316	5322 122 32447	Capacitor, 1 pF, 5% 50V NP0 0805
C317	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C318	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R 0805
C319	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R 0805
C320	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R 0805
C321	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R 0805
C322	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R 0805
C323	5322 122 32446	Capacitor, 470 nF, 20% 50V X7R 2220
C324	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C325	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R 0805
C326	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R 0805
C327	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R 0805
C331	5322 122 32447	Capacitor, 1 pF, 5% 50V NP0 0805
C332	5322 122 32449	Capacitor, 3.3 pF, 5% 50V NP0 0805

*No stock item.

PM 9608B
1.3 GHz HF Input, cont...

POS	SERVICE CODE	DESCRIPTION
C334	5322 122 32449	Capacitor, 3.30 pF, 5% 50V NP0 0805
C335	5322 122 32658	Capacitor, 22 pF, 5% 50V NP0 0805
GR303	5322 130 31544	Diode, 0.03 A, BAT17 SOT23
GR304	5322 130 31544	Diode, 0.03 A, BAT17 SOT23
GR305	5322 130 31544	Diode, 0.03 A, BAT17 SOT23
GR306	5322 130 31544	Diode, 0.03 A, BAT17 SOT23
GR307	5322 130 31544	Diode, 0.03 A, BAT17 SOT23
GR308	5322 130 34337	Diode, 0.10 A, BAV99 SOT23
GR309	5322 130 31544	Diode, 0.03 A, BAT17 SOT23
GR311	5322 130 80246	Diode, BAR 16-1 SOT23
GR313	5322 130 34337	Diode, 0.10 A, BAV99 SOT23
GR315	5322 130 31544	Diode, 0.03 A, BAT17 SOT23
IC301	5322 209 71557	IC, UPC1652G SO-8 VAR
IC302	5322 209 61399	IC, U833BS DIL8
IC303	5322 209 71553	IC, NE532D DUAL SO-8
L301	5322 157 52689	Choke, 0.10 µH, 10% MLnF3216DR10K
L307	5322 157 52689	Choke, 0.10 µH, 10% MLnF3216DR10K
R301	5322 116 80444	Resistor, 470 Ω, 1% 1/8W 100 ppm 1206
R302	5322 116 80444	Resistor, 470 Ω, 1% 1/8W 100 ppm 1206
R303	5322 116 80444	Resistor, 470 Ω, 1% 1/8W 100 ppm 1206
R304	4822 111 90186	Resistor, 22 Ω, 1% 1/8W 100 ppm 1206
R305	4822 111 90186	Resistor, 22 Ω, 1% 1/8W 100 ppm 1206
R306	4822 111 90186	Resistor, 22 Ω, 1% 1/8W 100 ppm 1206
R307	4822 111 90186	Resistor, 22 Ω, 1% 1/8W 100 ppm 1206
R308	4822 111 90186	Resistor, 22 Ω, 1% 1/8W 100 ppm 1206
R309	4822 111 90186	Resistor, 22 Ω, 1% 1/8W 100 ppm 1206
R310	4822 111 90154	Resistor, 270 Ω, 1% 1/8W 100 ppm 1206
R311	5322 116 80438	Resistor, 330 Ω, 1% 1/8W 100 ppm 1206
R312	5322 116 80438	Resistor, 330 Ω, 1% 1/8W 100 ppm 1206
R313	4822 111 90397	Resistor, 8.20 Ω, 10% 1/4W RC-01 1206
R314	5322 116 80431	Resistor, 150 Ω, 1% 1/8W 100 ppm 1206
R315	4822 111 90397	Resistor, 8.20 Ω, 10% 1/4W RC-01 1206
R316	5322 116 80433	Resistor, 220 Ω, 1% 1/8W 100 ppm 1206
R319	4822 111 90357	Resistor, 33 Ω, 1% 1/8W 100 ppm 1206
R320	5322 111 90095	Resistor, 10 Ω, 1% 1/8W 100 ppm 1206
R321	5322 116 80448	Resistor, 47 Ω, 1% 1/8W 100 ppm 1206
R322	5322 116 80448	Resistor, 47 Ω, 1% 1/8W 100 ppm 1206
R324	5322 111 90242	Resistor, 180 Ω, 1% 1/8W 100 ppm 1206
R325	5322 116 80437	Resistor, 2.70 kΩ, 1% 1/8W 100 ppm 1206
R326	5322 116 80446	Resistor, 47 kΩ, 1% 1/8W 100 ppm 1206
R327	5322 116 80434	Resistor, 2.20 kΩ, 1% 1/8W 100 ppm 1206
R328	4822 111 90154	Resistor, 270 Ω, 1% 1/8W 100 ppm 1206
R329	5322 116 80438	Resistor, 330 Ω, 1% 1/8W 100 ppm 1206
R330	5322 101 14299	Potentiometer, 1 kΩ, 10% 72X
R331	5322 116 80446	Resistor, 47 kΩ, 1% 1/8W 100 ppm 1206
R332	5322 116 80445	Resistor, 4.70 kΩ, 1% 1/8W 100 ppm 1206
R333	5322 116 80439	Resistor, 3.30 kΩ, 1% 1/8W 100 ppm 1206
R335	5322 116 80429	Resistor, 100 kΩ, 1% 1/8W 100 ppm 1206
R336	5322 116 80445	Resistor, 4.70 kΩ, 1% 1/8W 100 ppm 1206
R337	5322 116 80439	Resistor, 3.30 kΩ, 1% 1/8W 100 ppm 1206

* No stock item.

PM 9608B
1.3 GHz HF Input, cont...

POS	SERVICE CODE	DESCRIPTION
R338	5322 116 80445	Resistor, 4.70 kΩ, 1% 1/8W 100 ppm 1206
R339	5322 116 80439	Resistor, 3.30 kΩ, 1% 1/8W 100 ppm 1206
R340	5322 116 80441	Resistor, 33 kΩ, 1% 1/8W 100 ppm 1206
R341	5322 116 80445	Resistor, 4.70 kΩ, 1% 1/8W 100 ppm 1206
R342	5322 116 80427	Resistor, 1 kΩ, 1% 1/8W 100 ppm 1206
R343	5322 111 90113	Resistor, 560 Ω, 1% 1/8W 100 ppm 1206
R344	5322 116 80426	Resistor, 100 Ω, 1% 1/8W 100 ppm 1206
R345	5322 111 90376	Resistor, 4.70 Ω, 10% 1/4W RC-01 1206
R347	5322 116 80444	Resistor, 470 Ω, 1% 1/8W 100 ppm 1206
R348	4822 111 90124	Resistor, 82 Ω, 1% 1/8W 100 ppm 1206
R349	5322 116 80437	Resistor, 2.70 kΩ, 1% 1/8W 100 ppm 1206
R350	5322 116 80437	Resistor, 2.70 kΩ, 1% 1/8W 100 ppm 1206
R351	5322 116 80441	Resistor, 33 kΩ, 1% 1/8W 100 ppm 1206
R352	5322 116 80445	Resistor, 4.70 kΩ, 1% 1/8W 100 ppm 1206
R353	5322 116 80428	Resistor, 10 kΩ, 1% 1/8W 100 ppm 1206
R354	5322 111 90376	Resistor, 4.70 Ω, 10% 1/4W RC-01 1206
R355	4822 111 90357	Resistor, 33 Ω, 1% 1/8W 100 ppm 1206
R356	4822 111 90186	Resistor, 22 Ω, 1% 1/8W 100 ppm 1206
R357	5322 116 80426	Resistor, 100 Ω, 1% 1/8W 100 ppm 1206
TS301	5322 130 42567	Transistor, BFQ67 SOT23
TS302	5322 130 42567	Transistor, BFQ67 SOT23
TS303	4822 130 60511	Transistor, BC847B 0.1A 45V SOT23
TS304	4822 130 60511	Transistor, BC847B 0.1A 45V SOT23
TS305	5322 130 60508	Transistor, BC857B 0.1A 45V SOT23
TS306	5322 130 60508	Transistor, BC857B 0.1A 45V SOT23

PM 9615
1.0 GHz HF Input

POS	SERVICE CODE	DESCRIPTION
	5322 321 22313	Cable assy
	5322 447 91672*	Shield
	5322 447 91673*	Shield cover
	5322 401 11256*	Cable clip
BU301	5322 267 60199	Connector, R 114426 SMB
BU302	5322 290 34064	Flat pin, 2.80 mm, E184/8 LESA SN BAND
BU303	5322 267 54195	Connector, 10 pol, 22-15-2106 4455-AC
BU304	5322 290 34064	Flat pin, 2.80 mm, E184/8 LESA SN BAND
C301	5322 122 32531	Capacitor, 100 pF, 5% 50V NP0 0805
C302	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C303	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C304	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R 0805
C305	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C306	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C307	5322 122 32452	Capacitor, 47 pF, 5% 50V NP0 0805

* No stock item.

PM 9615
1.0 GHz HF Input, cont...

POS	SERVICE CODE	DESCRIPTION
C308	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C310	5322 122 32287	Capacitor, 4.70 pF, 5% 50V NP0 0805
C311	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C312	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C313	5322 122 32481	Capacitor, 15 pF, 5% 50V NP0 0805
C314	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C316	5322 122 33063	Capacitor, 2.20 pF, 5% 50V NP0 0805
C317	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C318	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R 0805
C319	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R 0805
C320	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R 0805
C321	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R 0805
C322	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R 0805
C323	5322 122 32446	Capacitor, 470 nF, 20% 50V X7R 2220
C324	5322 122 34123	Capacitor, 1 nF, 20% 50V X7R 0805
C325	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R 0805
C326	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R 0805
C327	5322 122 34098	Capacitor, 10 nF, 20% 50V X7R 0805
GR303	5322 130 31544	Diode, 0.03 A, BAT17 SOT23
GR304	5322 130 31544	Diode, 0.03 A, BAT17 SOT23
GR305	5322 130 31544	Diode, 0.03 A, BAT17 SOT23
GR306	5322 130 31544	Diode, 0.03 A, BAT17 SOT23
GR307	5322 130 31544	Diode, 0.03 A, BAT17 SOT23
GR308	5322 130 34337	Diode, 0.10 A, BAV99 SOT23
GR309	5322 130 31544	Diode, 0.03 A, BAT17 SOT23
GR311	5322 130 80246	Diode, BAR 16-1 SOT23
GR313	5322 130 34337	Diode, 0.10 A, BAV99 SOT23
IC301	5322 209 71557	IC, UPC1652G SO-8
IC302	5322 209 71554	IC, SAB1256P /256 DIL-8
IC303	5322 209 71553	IC, NE532D DUAL SO-8
L301	5322 157 52986	Choke, 0.10 µH, 10% MLF3216DR10K
L307	5322 157 52986	Choke, 0.10 µH, 10% MLF3216DR10K
R301	5322 116 80444	Resistor, 470 Ω, 1% 1/8W 100 ppm 1206
R302	5322 116 80444	Resistor, 470 Ω, 1% 1/8W 100 ppm 1206
R303	5322 116 80444	Resistor, 470 Ω, 1% 1/8W 100 ppm 1206
R304	4822 111 90186	Resistor, 22 Ω, 1% 1/8W 100 ppm 1206
R305	4822 111 90186	Resistor, 22 Ω, 1% 1/8W 100 ppm 1206
R306	4822 111 90186	Resistor, 22 Ω, 1% 1/8W 100 ppm 1206
R307	4822 111 90186	Resistor, 22 Ω, 1% 1/8W 100 ppm 1206
R308	4822 111 90186	Resistor, 22 Ω, 1% 1/8W 100 ppm 1206
R309	4822 111 90186	Resistor, 22 Ω, 1% 1/8W 100 ppm 1206
R310	4822 111 90154	Resistor, 270 Ω, 1% 1/8W 100 ppm 1206
R311	5322 116 80438	Resistor, 330 Ω, 1% 1/8W 100 ppm 1206
R312	5322 116 80438	Resistor, 330 Ω, 1% 1/8W 100 ppm 1206
R313	4822 111 90397	Resistor, 8.20 Ω, 10% 1/4W RC-01 1206
R314	5322 116 80431	Resistor, 150 Ω, 1% 1/8W 100 ppm 1206
R315	4822 111 90397	Resistor, 8.20 Ω, 10% 1/4W RC-01 1206
R316	5322 116 80433	Resistor, 220 Ω, 1% 1/8W 100 ppm 1206
R319	5322 116 80448	Resistor, 47 Ω, 1% 1/8W 100 ppm 1206
R320	5322 111 90095	Resistor, 10 Ω, 1% 1/8W 100 ppm 1206

* No stock item.

PM 9615
1.0 GHz HF Input, cont...

POS	SERVICE CODE	DESCRIPTION
R321	5322 116 80448	Resistor, 47 Ω, 1% 1/8W 100 ppm 1206
R322	5322 116 80448	Resistor, 47 Ω, 1% 1/8W 100 ppm 1206
R324	5322 116 80426	Resistor, 100 Ω, 1% 1/8W 100 ppm 1206
R325	5322 116 80437	Resistor, 2.70 kΩ, 1% 1/8W 100 ppm 1206
R326	5322 116 80446	Resistor, 47 kΩ, 1% 1/8W 100 ppm 1206
R327	5322 116 80434	Resistor, 2.20 kΩ, 1% 1/8W 100 ppm 1206
R328	4822 111 90154	Resistor, 270 Ω, 1% 1/8W 100 ppm 1206
R329	5322 116 80438	Resistor, 330 Ω, 1% 1/8W 100 ppm 1206
R330	5322 101 14299	Potentiometer, 1 kΩ, 10% 72X
R331	5322 116 80446	Resistor, 47 kΩ, 1% 1/8W 100 ppm 1206
R332	5322 116 80445	Resistor, 4.70 kΩ, 1% 1/8W 100 ppm 1206
R333	5322 116 80439	Resistor, 3.30 kΩ, 1% 1/8W 100 ppm 1206
R335	5322 116 80429	Resistor, 100 kΩ, 1% 1/8W 100 ppm 1206
R336	5322 116 80445	Resistor, 4.70 kΩ, 1% 1/8W 100 ppm 1206
R337	5322 116 80439	Resistor, 3.30 kΩ, 1% 1/8W 100 ppm 1206
R338	5322 116 80445	Resistor, 4.70 kΩ, 1% 1/8W 100 ppm 1206
R339	5322 116 80439	Resistor, 3.30 kΩ, 1% 1/8W 100 ppm 1206
R340	5322 116 80441	Resistor, 33 kΩ, 1% 1/8W 100 ppm 1206
R341	5322 116 80445	Resistor, 4.70 kΩ, 1% 1/8W 100 ppm 1206
R342	5322 116 80427	Resistor, 1 kΩ, 1% 1/8W 100 ppm 1206
R343	5322 111 90113	Resistor, 560 Ω, 1% 1/8W 100 ppm 1206
R344	5322 116 80426	Resistor, 100 Ω, 1% 1/8W 100 ppm 1206
R345	5322 111 90376	Resistor, 4.70 Ω, 10% 1/4W RC-01 1206
R347	5322 116 80444	Resistor, 470 Ω, 1% 1/8W 100 ppm 1206
R348	4822 111 90339	Resistor, 120 Ω, 1% 1/8W 100 ppm 1206
R349	5322 116 80437	Resistor, 2.70 kΩ, 1% 1/8W 100 ppm 1206
R350	5322 116 80437	Resistor, 2.70 kΩ, 1% 1/8W 100 ppm 1206
R351	5322 116 80441	Resistor, 33 kΩ, 1% 1/8W 100 ppm 1206
R352	5322 116 80445	Resistor, 4.70 kΩ, 1% 1/8W 100 ppm 1206
R353	5322 116 80428	Resistor, 10 kΩ, 1% 1/8W 100 ppm 1206
R354	5322 111 90376	Resistor, 4.70 Ω, 10% 1/4W RC-01 1206
TS301	5322 130 42567	Transistor, BFQ67 SOT23
TS302	5322 130 42567	Transistor, BFQ67 SOT23
TS303	4822 130 60511	Transistor, BC847B 0.1A 45V SOT23
TS304	4822 130 60511	Transistor, BC847B 0.1A 45V SOT23
TS305	5322 130 60508	Transistor, BC857B 0.1A 45V SOT23
TS306	5322 130 60508	Transistor, BC857B 0.1A 45V SOT23

* No stock item.

DRAWINGS AND DIAGRAMS

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How to read the diagrams

This chapter contains circuit diagrams and component layouts for the PM 6665 and the PM 6666 counters, and futhermore, for their options; PM 9604, PM 9605, PM 9608, PM 9608B, and PM 9615.

The diagrams have been completed with lists containing the IC's used. These lists give information about the use of those pins which are not shown in the diagrams, such as GND and supply voltages.

Signals

The signals in these units are named after what they do, e.g. IDENT is used for identifying the HF input.

Two different types of arrows are used to mark references for continued connection somewhere else in the diagram.

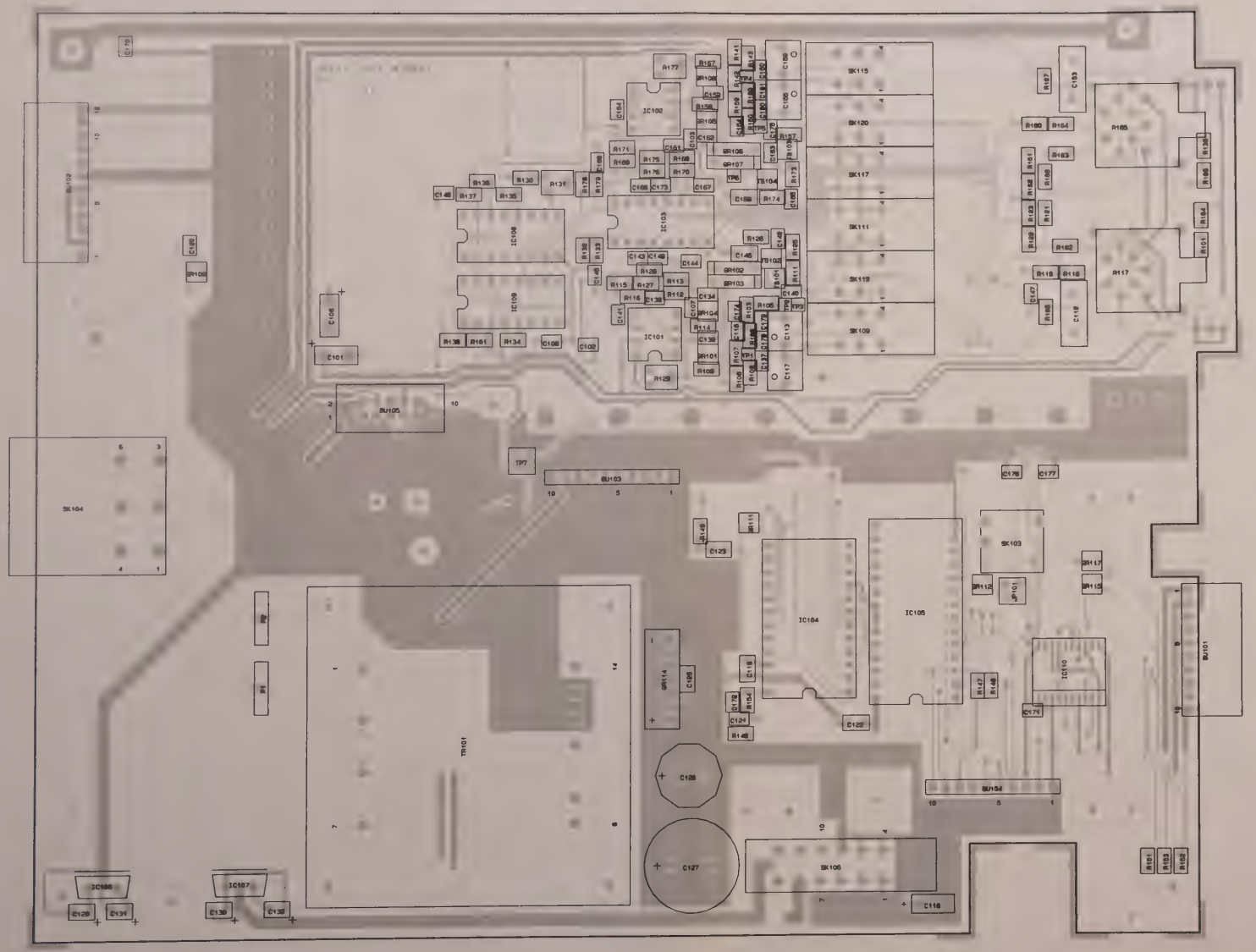
This arrow is used if the reference is directed to a point located on the same page. The example means connection to IC123, pin 4 (same page).

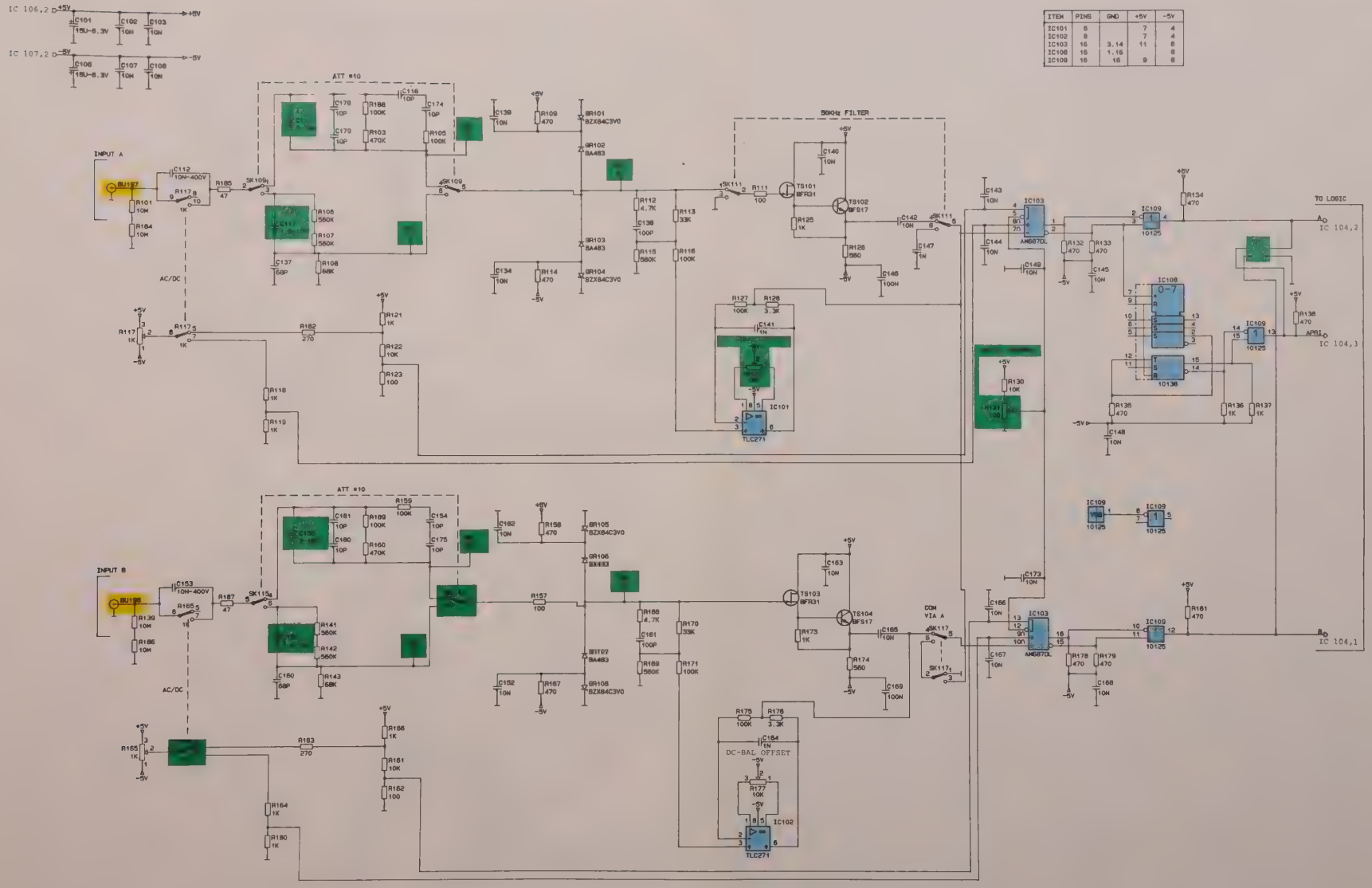
This arrow is used if the reference is directed to a point located on another page. The example means connection to IC432, pin 1.

Coloured areas

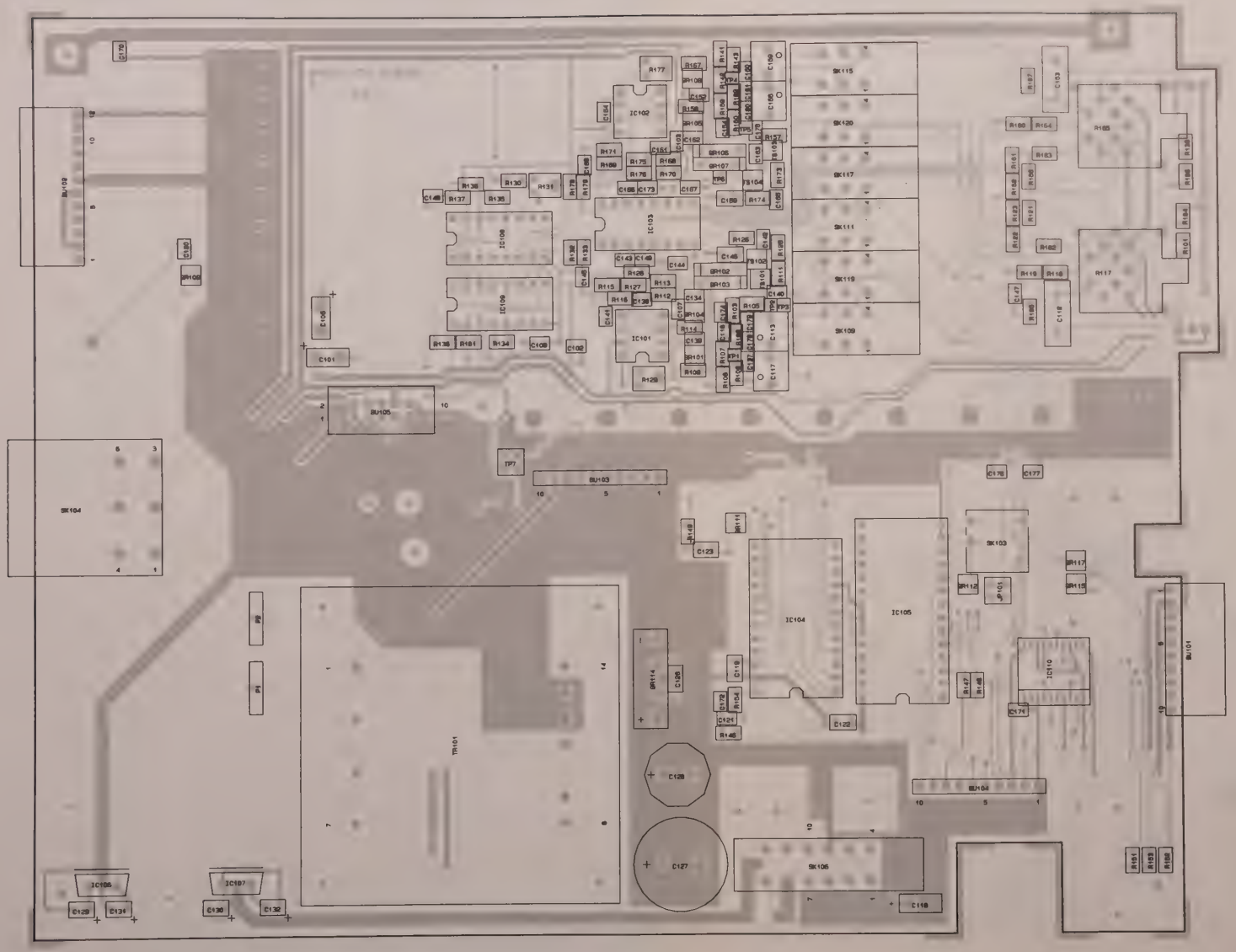
The coloured areas in the diagrams represent following functions:

Blue = Integrated circuits
Green = Trim-points or test points
Orange = Connectors



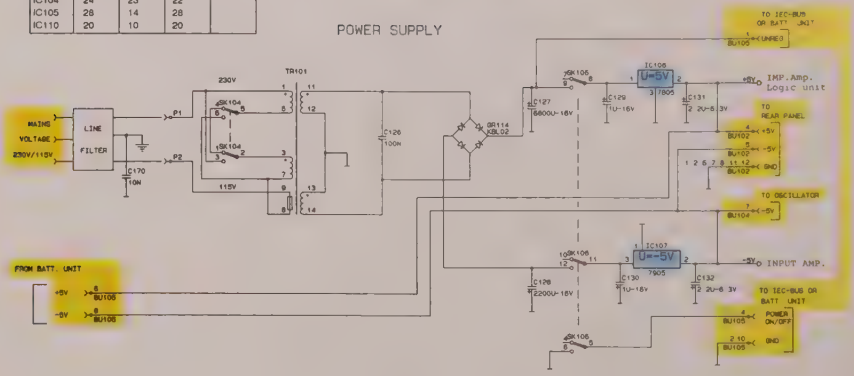

ITEM | PINS | GND | +5V | -5V
IC101 | 8 | | 7 | 4
IC102 | 8 | | 7 | 4
IC103 | 16 | 3,14 | 11 | 6
IC108 | 16 | 1,16 | | 8
IC109 | 16 | 16 | 9 | 8
ATT ×10
50KHz FILTER
INPUT A
INPUT B
AC/DC
DC-BAL OFFSET
COM VIA A
TO LOGIC
IC 104,2
IC 104,3
IC 104,1
TLC271
AM687DL
10125
10138
43350 05

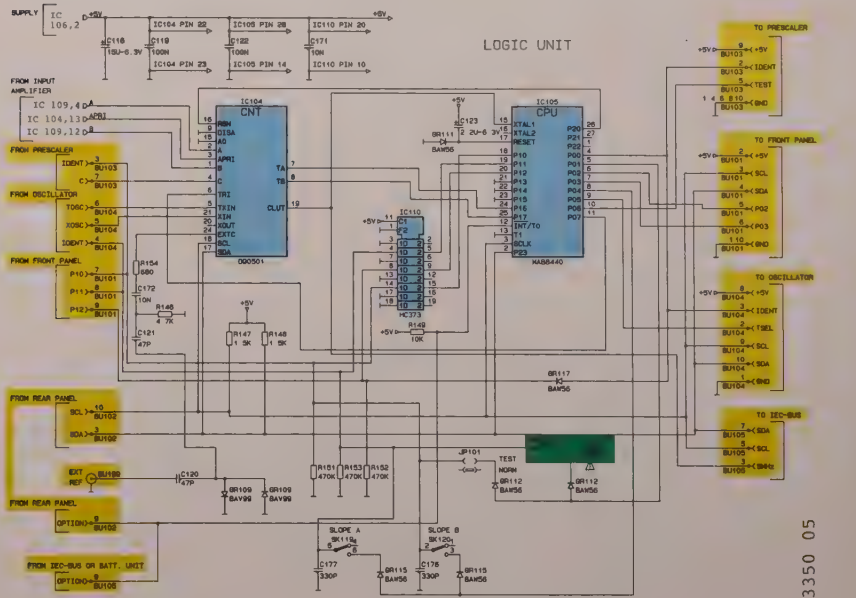
PM 6665 Basic Unit



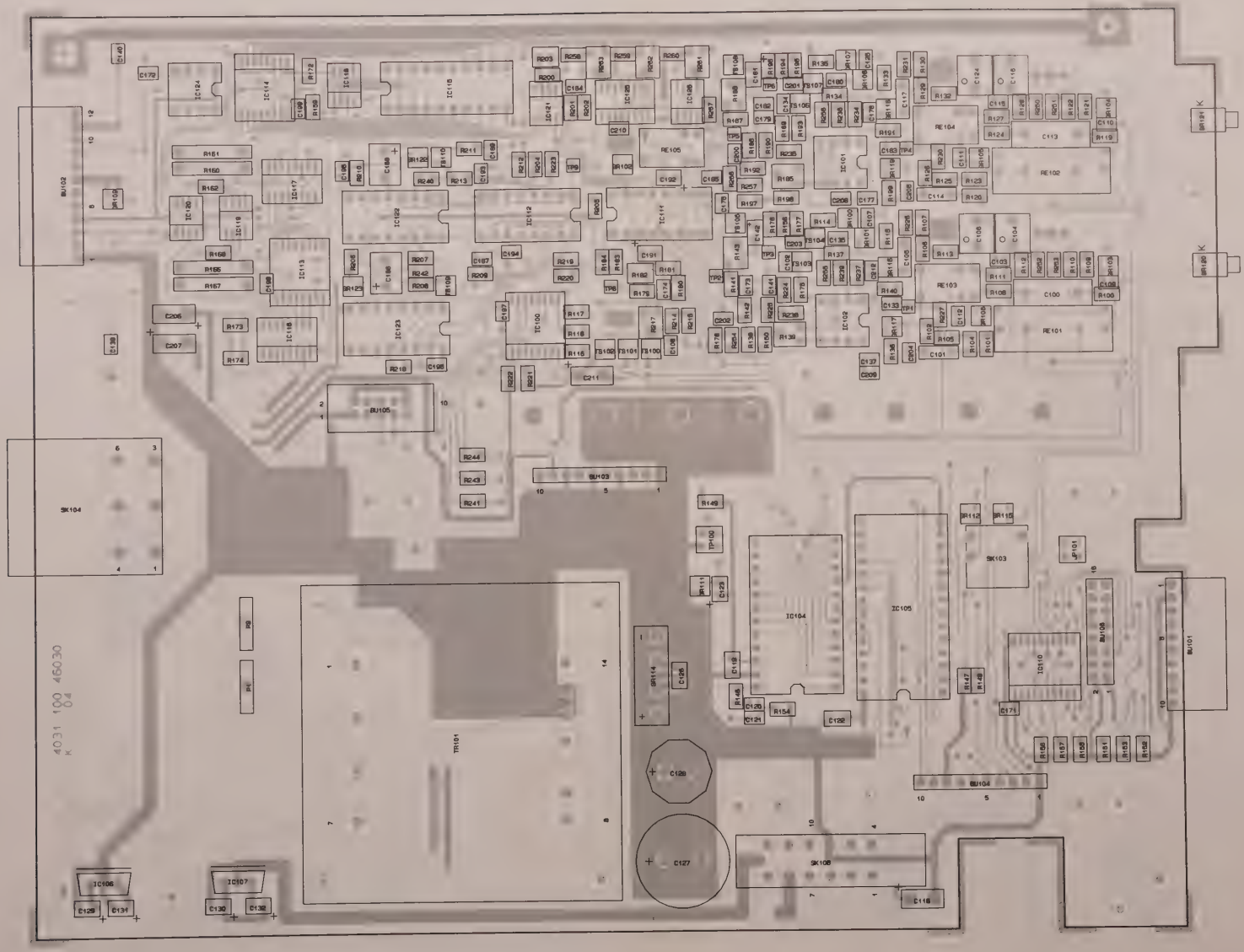
PM 6665 Basic Unit, Power Supply and Logic Unit

ITEMS	PINS	GND	+5V	-5V
IC104	24	23	22	
IC105	28	14	28	
IC110	20	10	20	

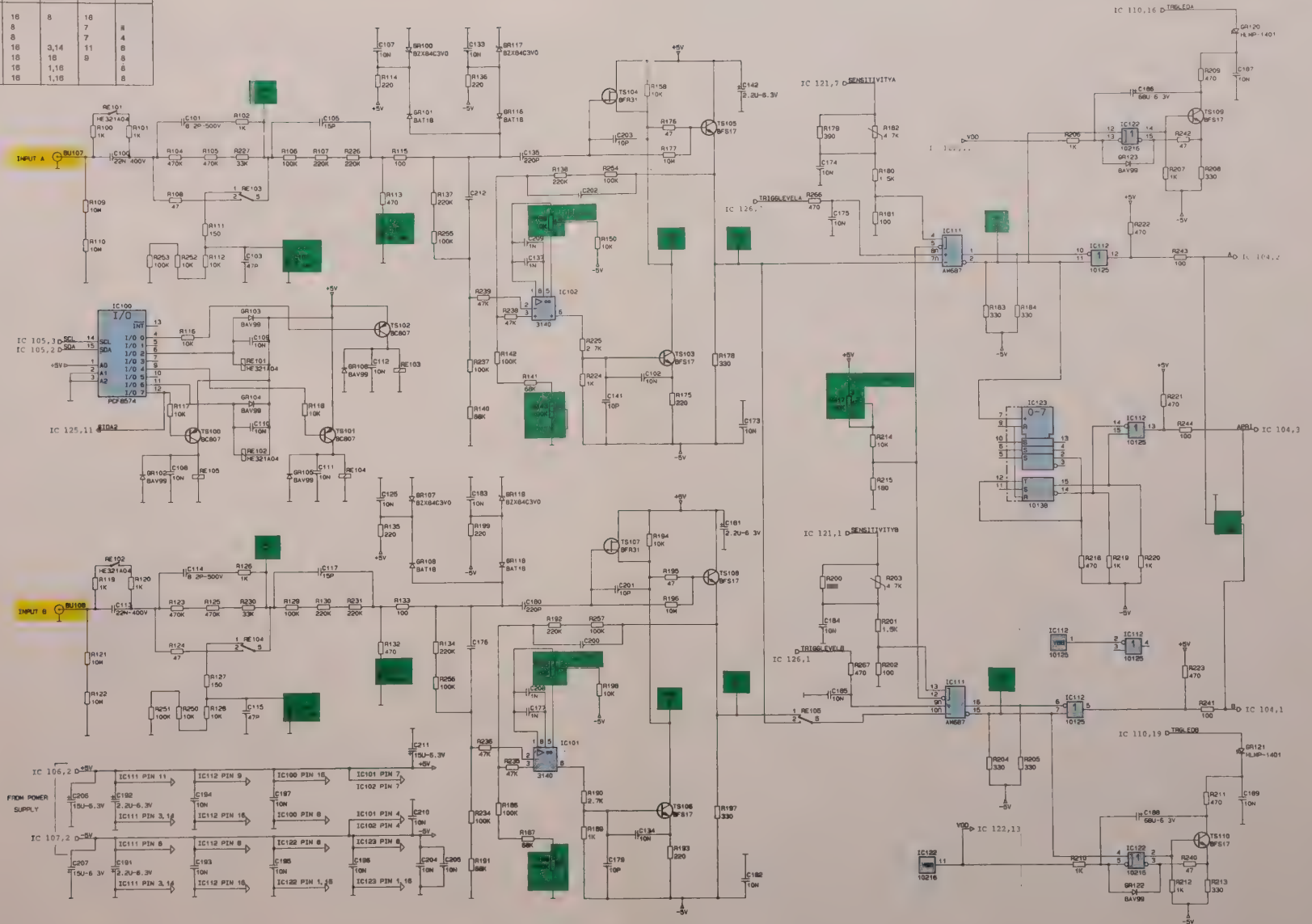




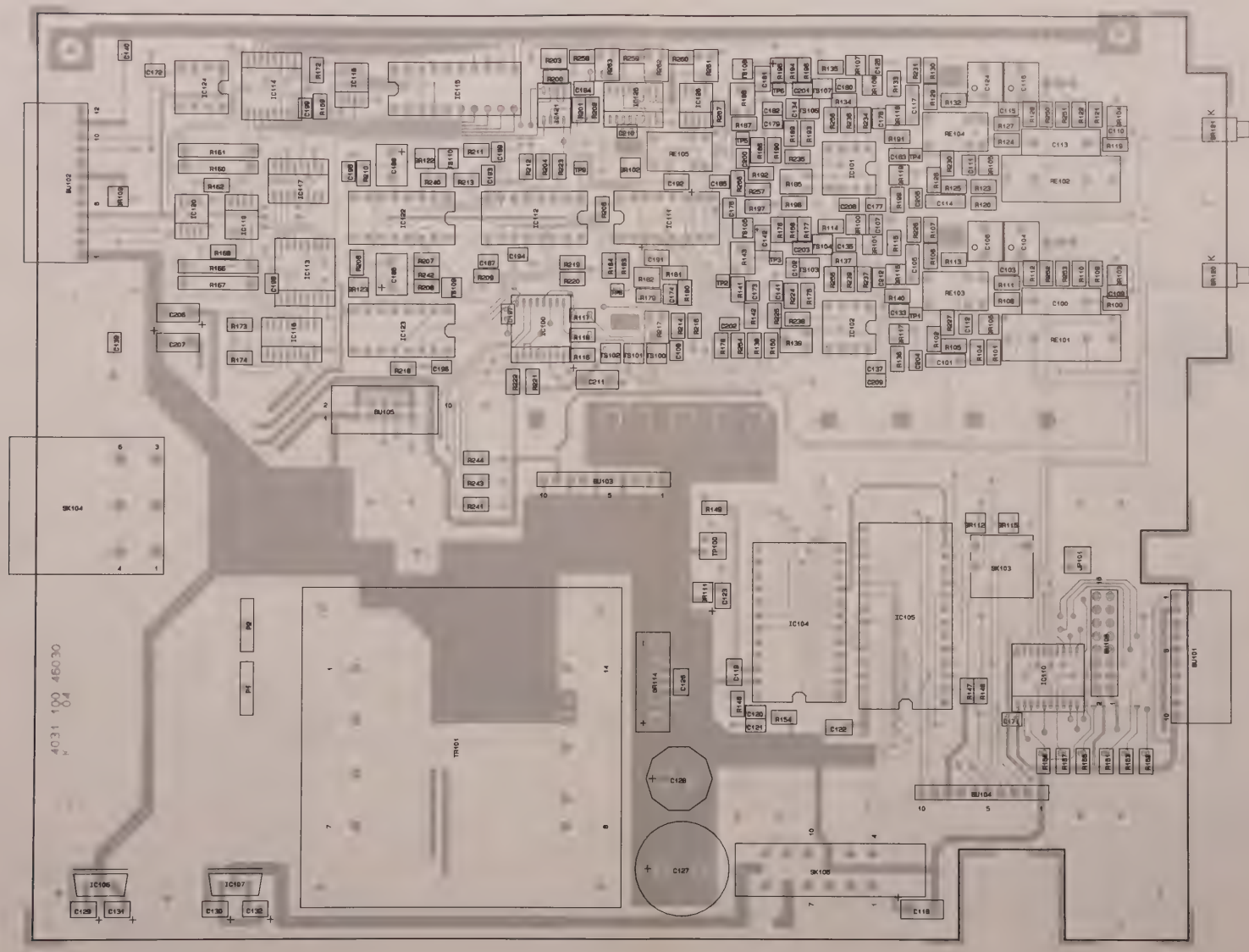
PM 6666 Basic Unit



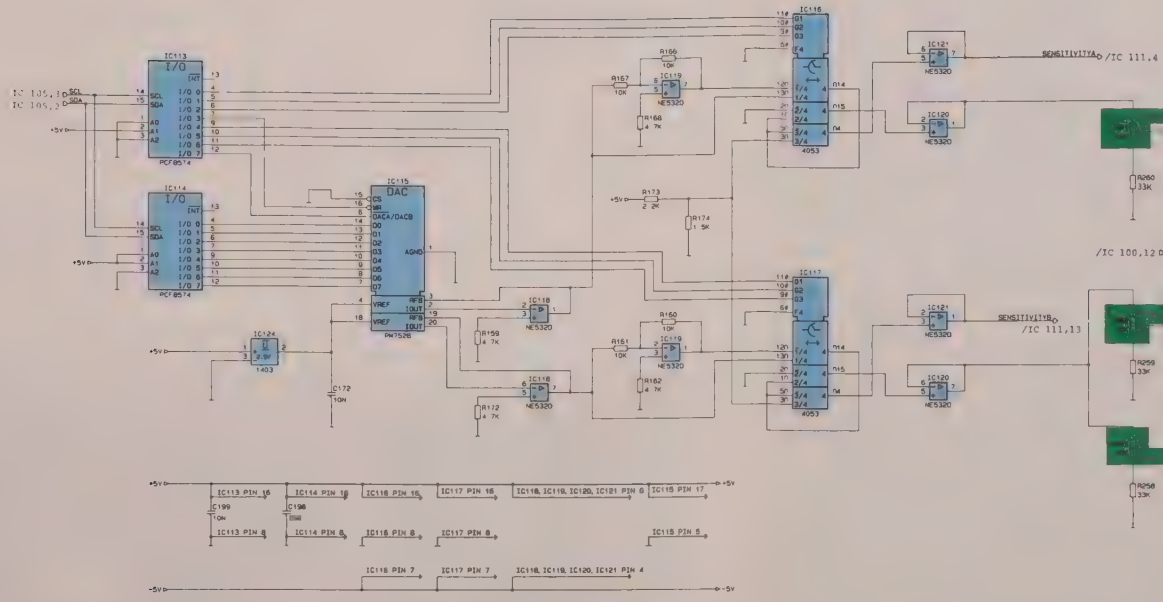
ITEMS	PINS	GND	+5V	-5V
IC100	16	8	16	
IC101	8		7	4
IC102	8		7	4
IC111	16	3,14	11	8
IC112	16	16	8	8
IC122	16	1,16		8
IC123	16	1,16		8



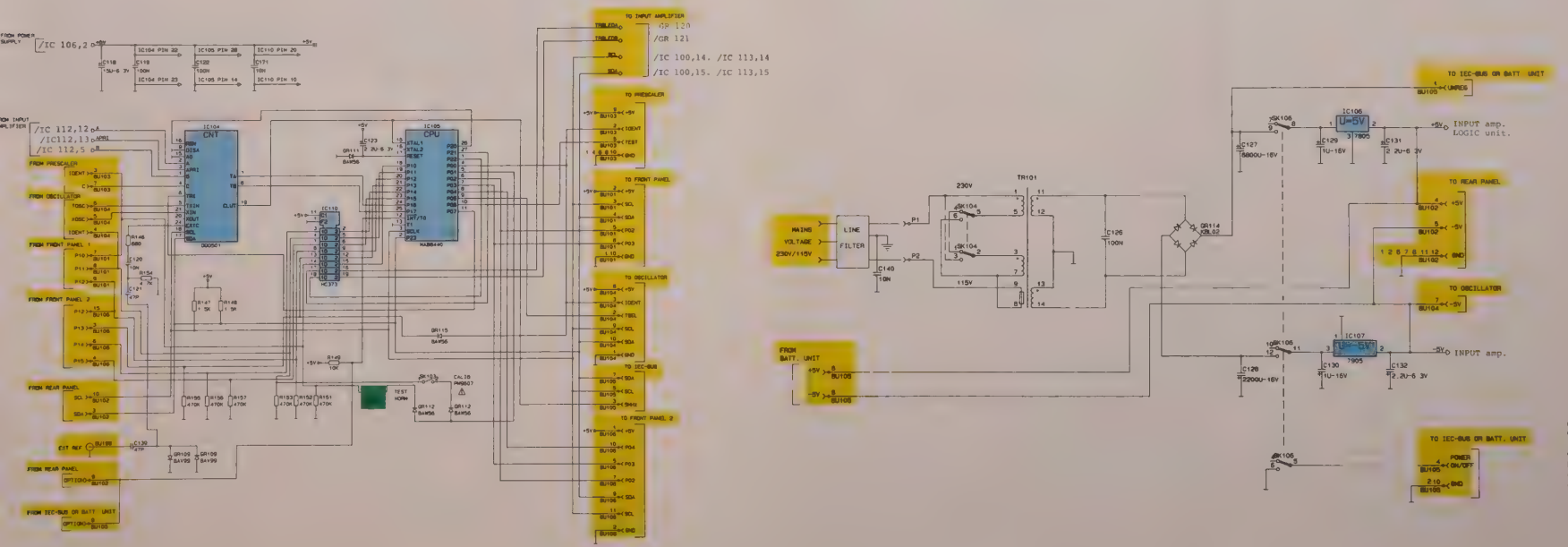
PM 6666 Basic Unit



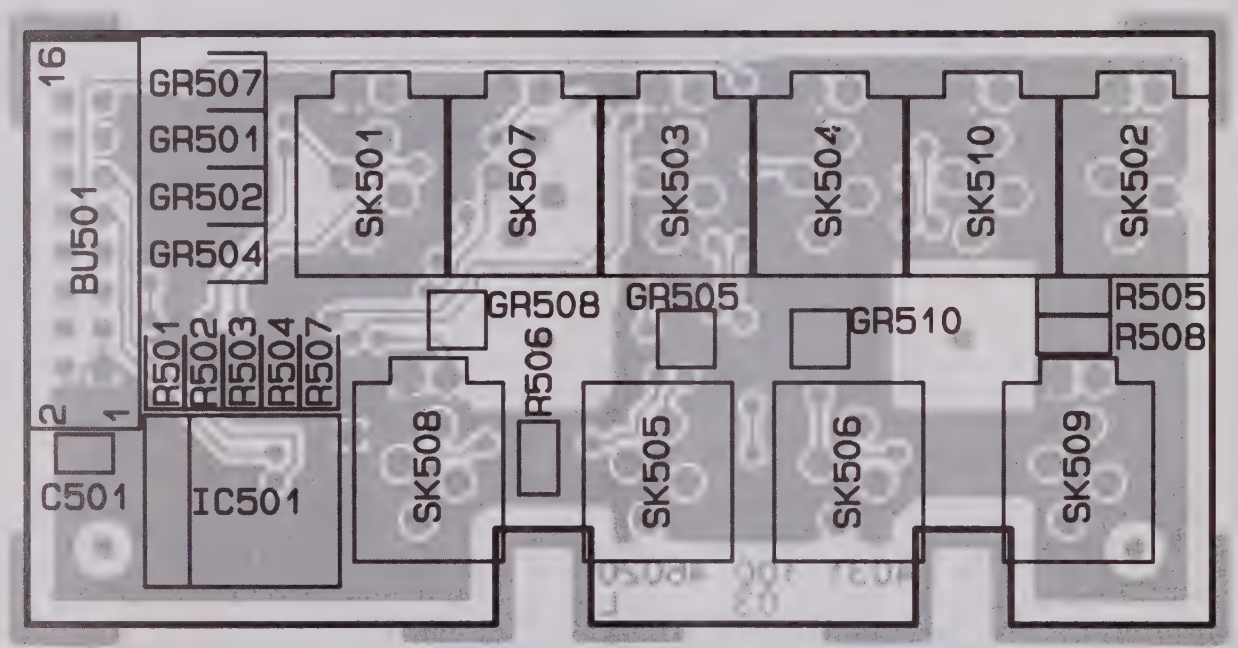
PM 6666 Basic Unit, Power Supply and Logic Unit



ITEMS	PINS	GND	+5V	-5V
IC104	24	23	22	
IC105	28	14	28	
IC110	20	10	20	
IC113	16	8	16	
IC114	16	16	16	
IC115	20	5	17	
IC116	8	16	16	7
IC117	16	8	16	7
IC118	8		8	4
IC119	8		8	4
IC120	8		8	4
IC121	8		8	4
IC125	16	8	16	7
IC126	8		8	4



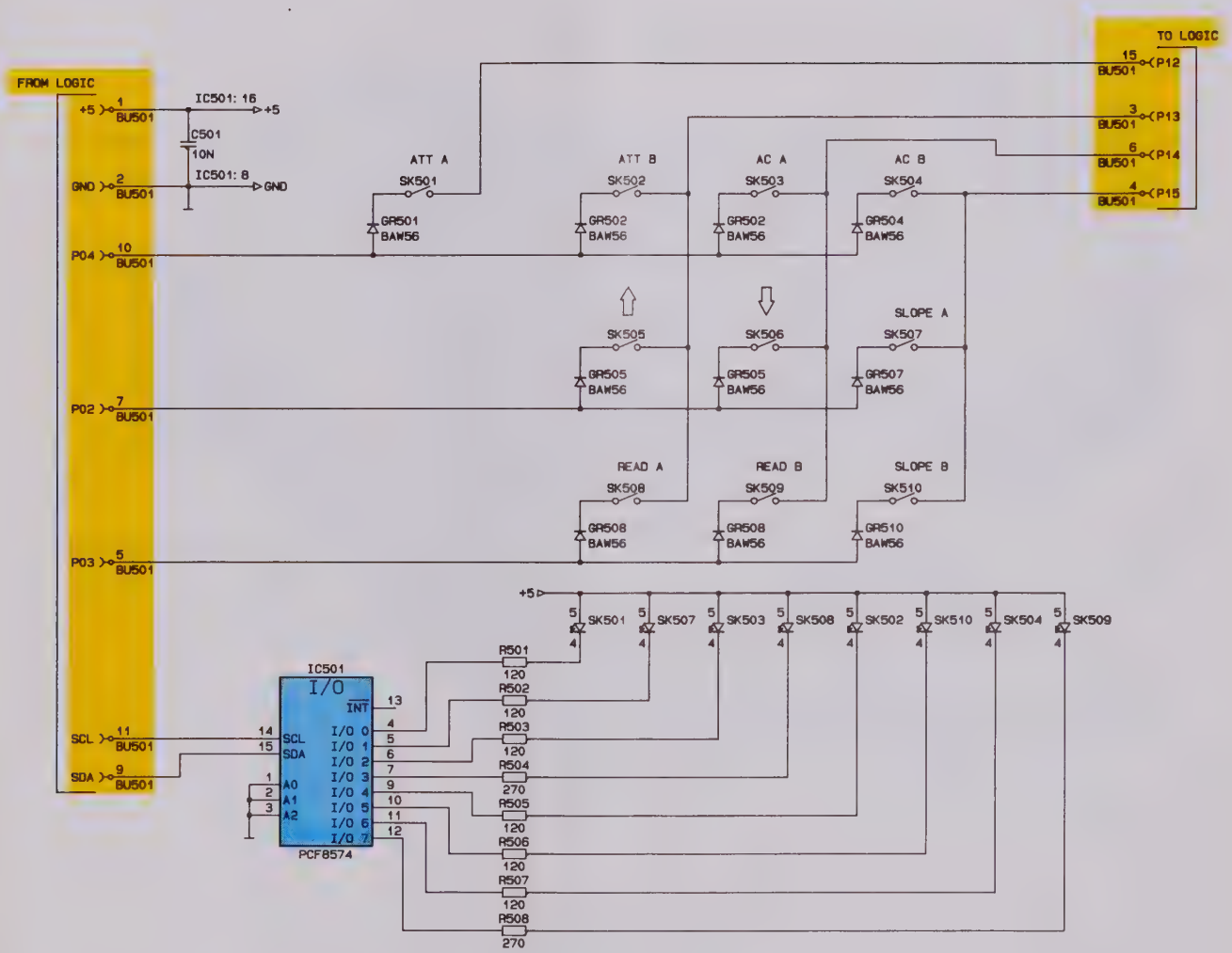
PM 6666 Key Board



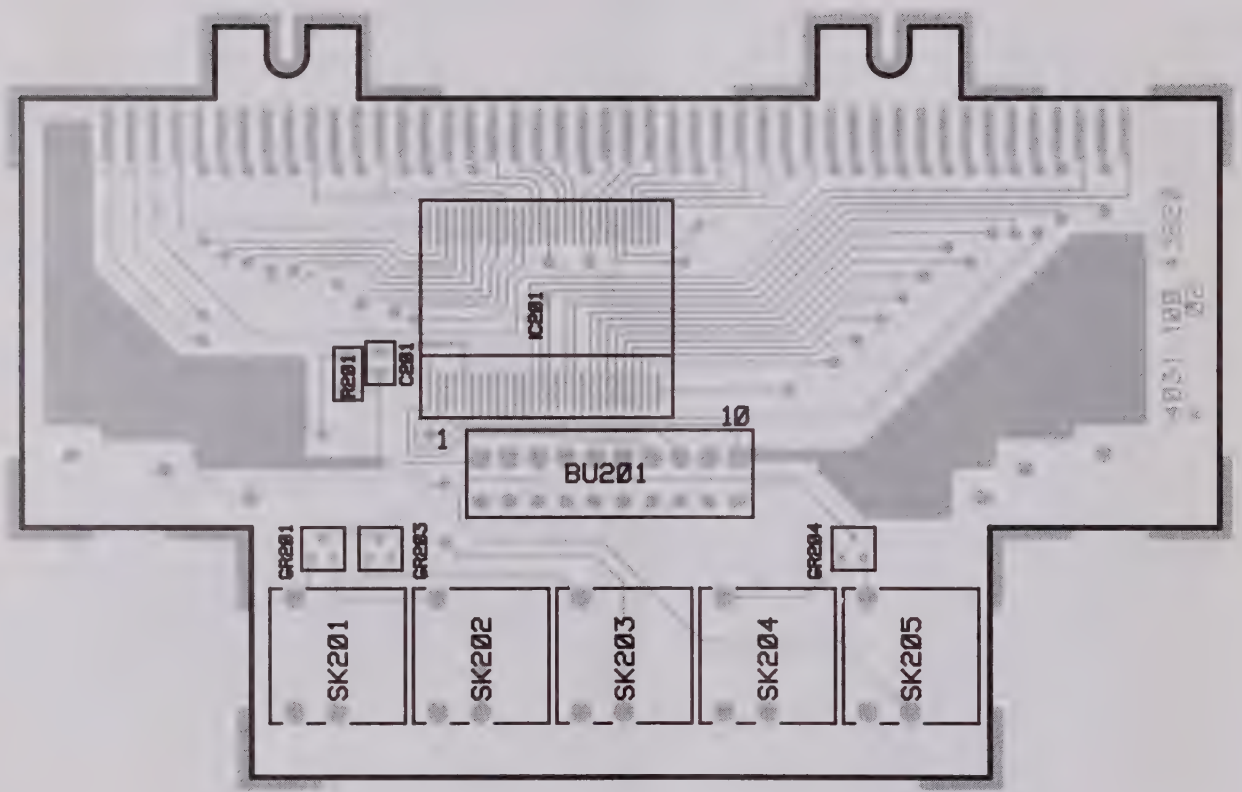
46020 03

PM 6666 Key Board

ITEMS	PINS	GND	+5V	-5V
IC501	16	8	16	

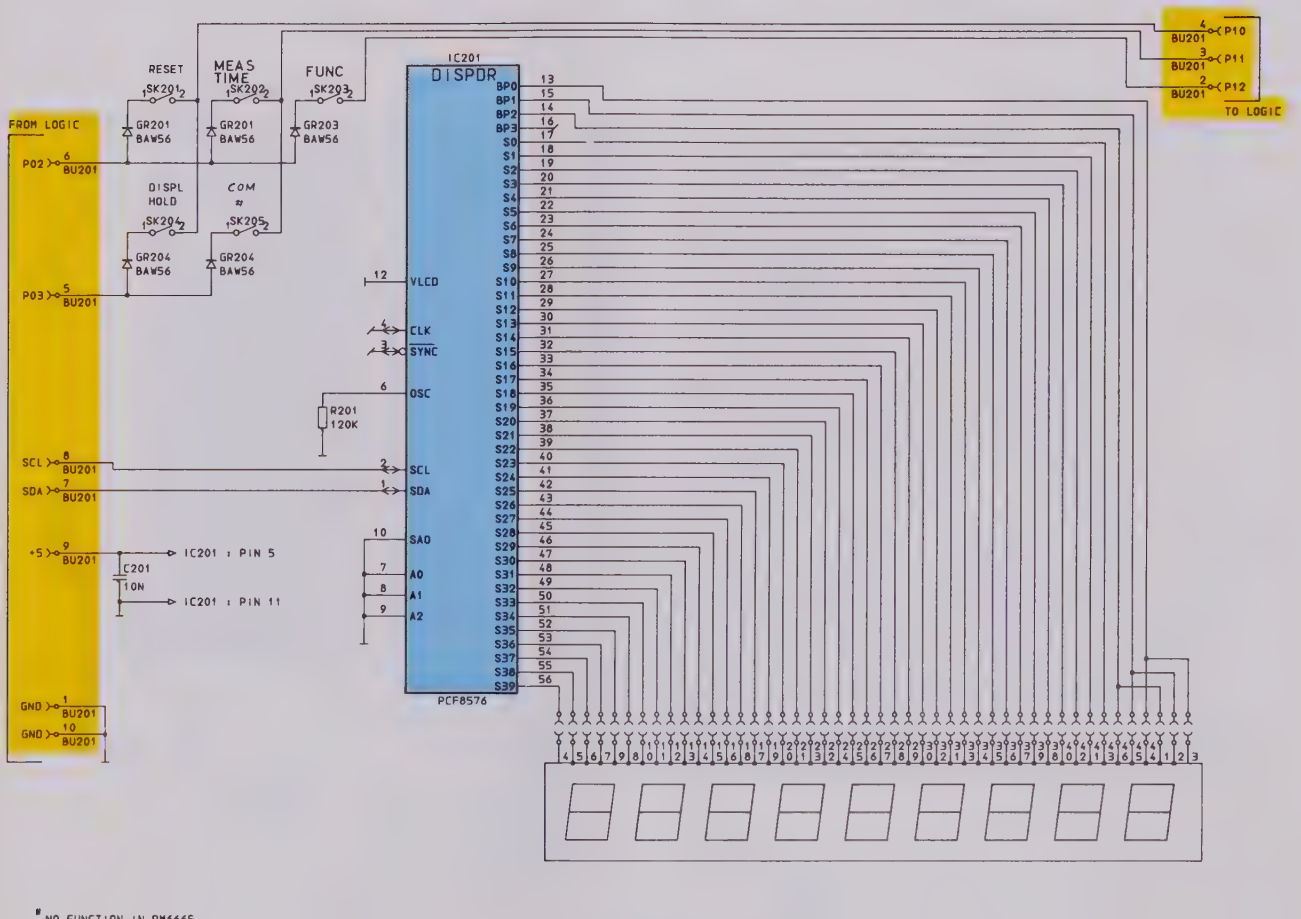


PM 6665 & PM 6666 Front Panel



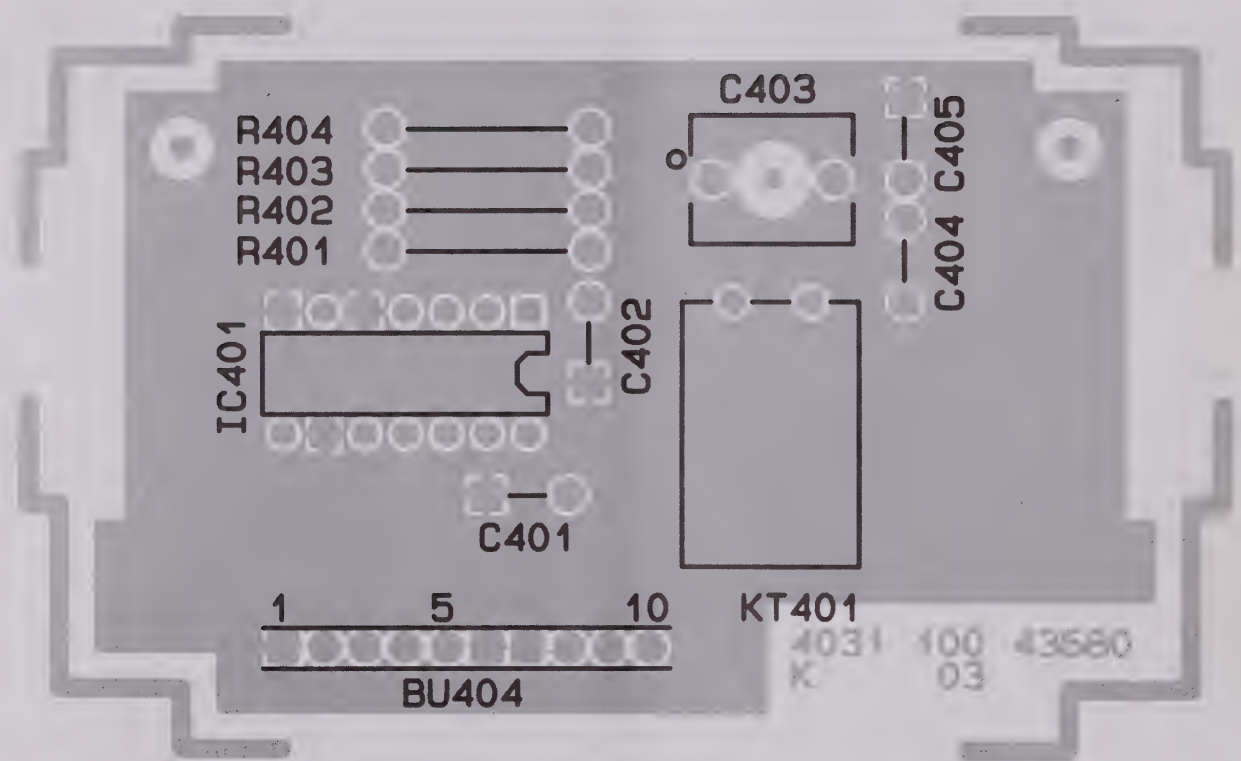
43620 02

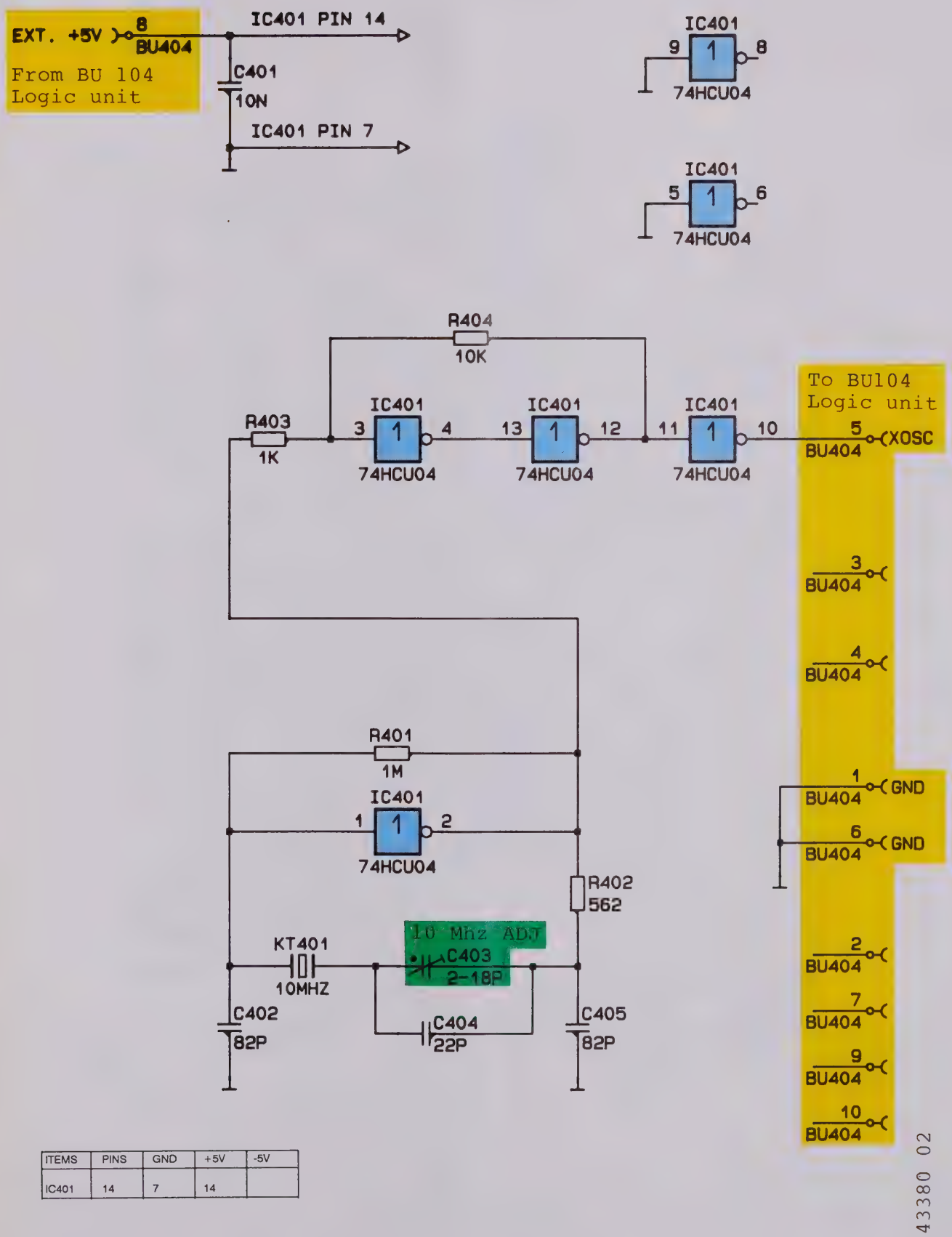
ITEMS	PINS	GND	+5V	-5V
IC201	56	11	5	



* NO FUNCTION IN PM6665

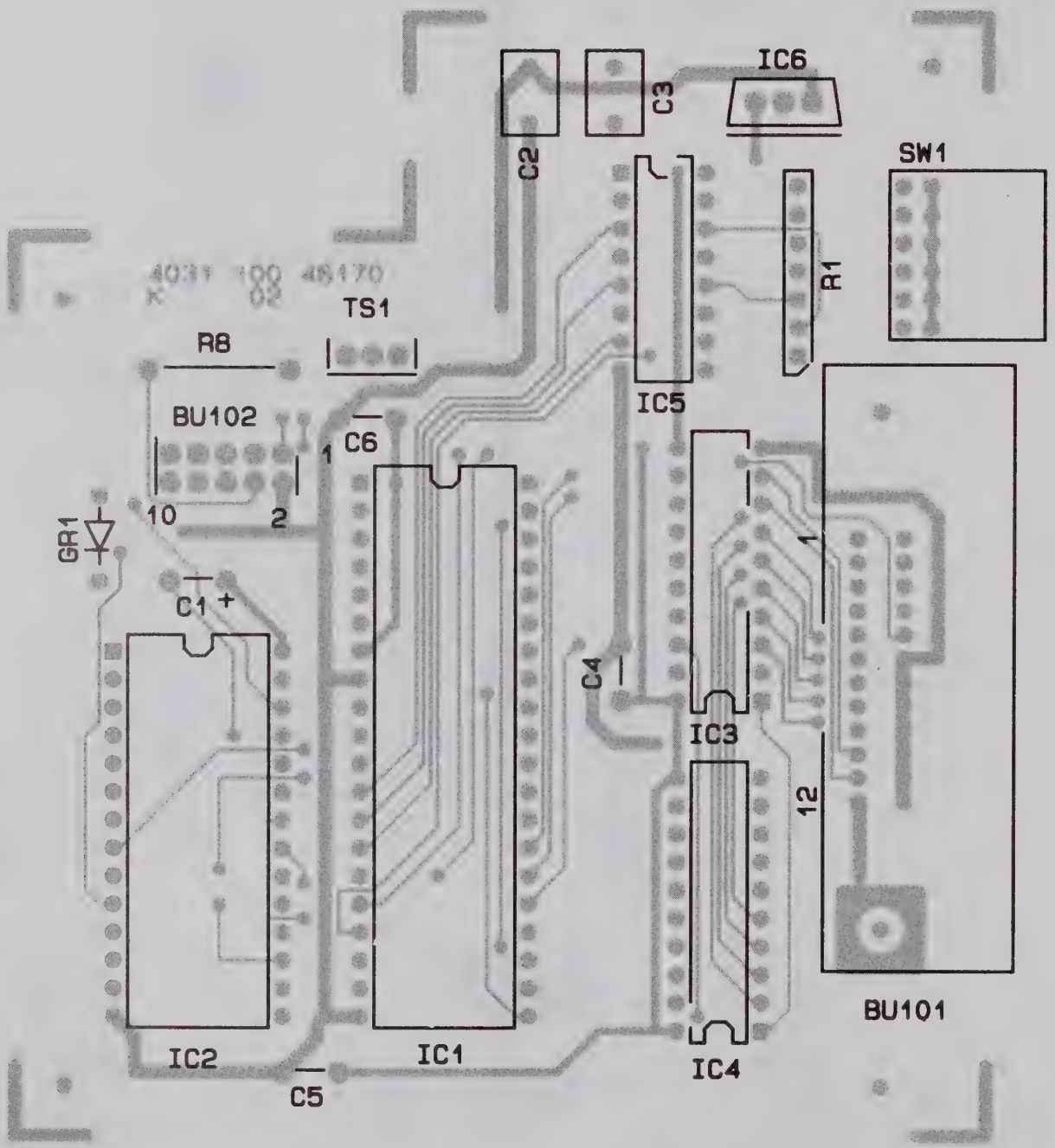
/.1. Oscillator (uncompensated crystal)



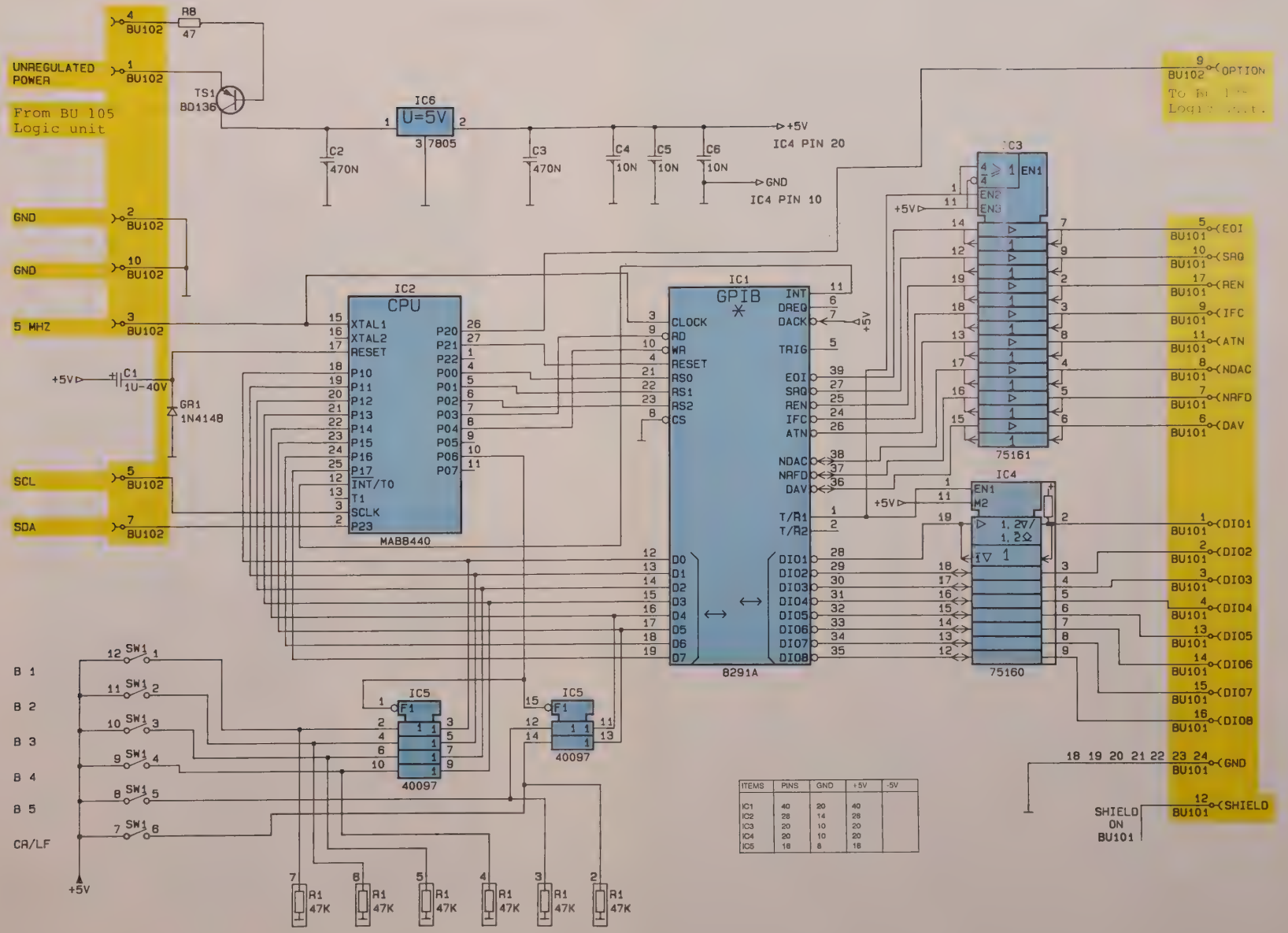


ITEMS	PINS	GND	+5V	-5V
IC401	14	7	14	

43380 02

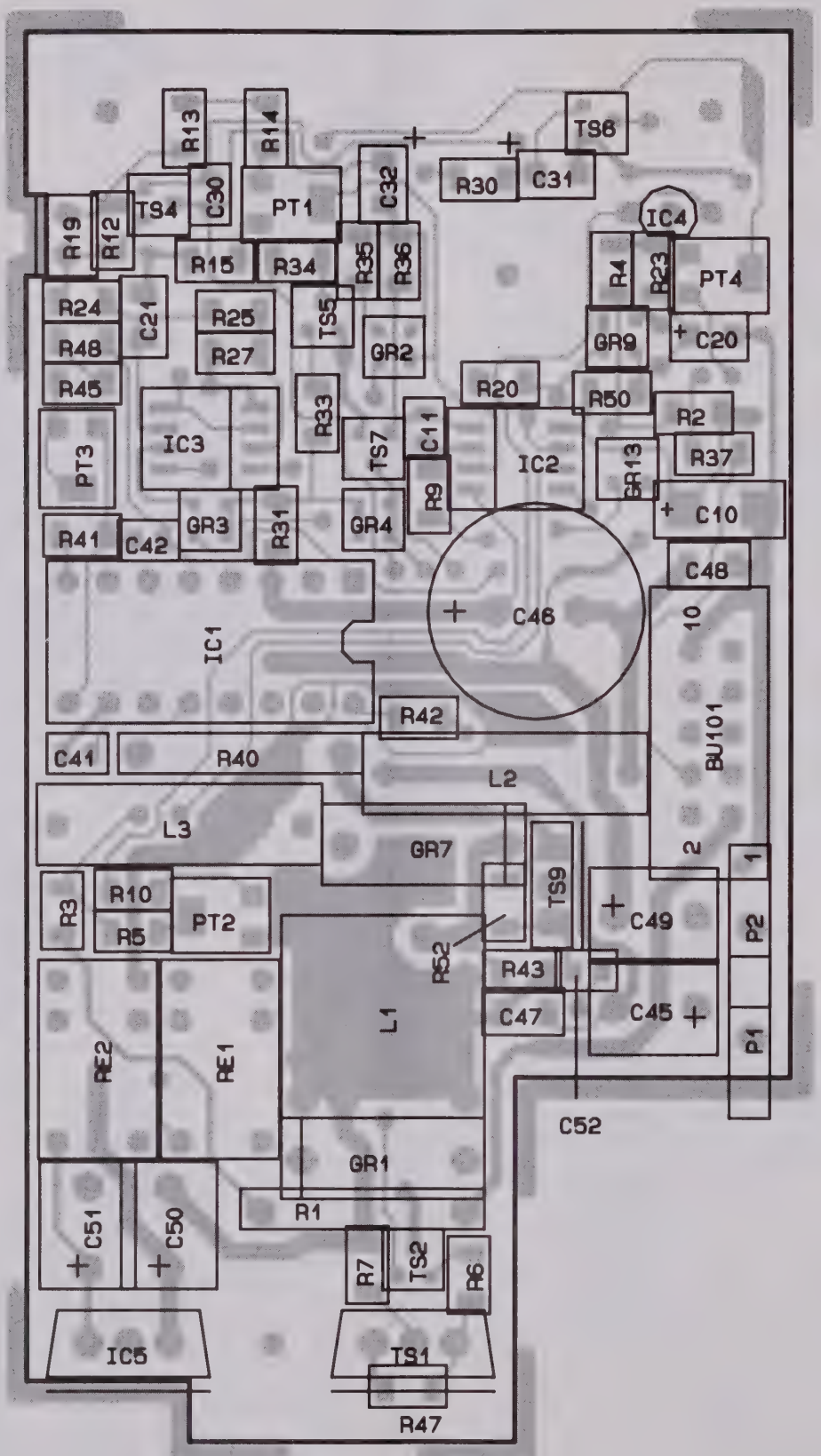

IC6
C3
C2
SW1
R1
TS1
R8
BU102
C6
IC5
1
10
2
GR1
C1
+
1
C4
IC3
12
BU101
IC2
IC1
IC4
C5

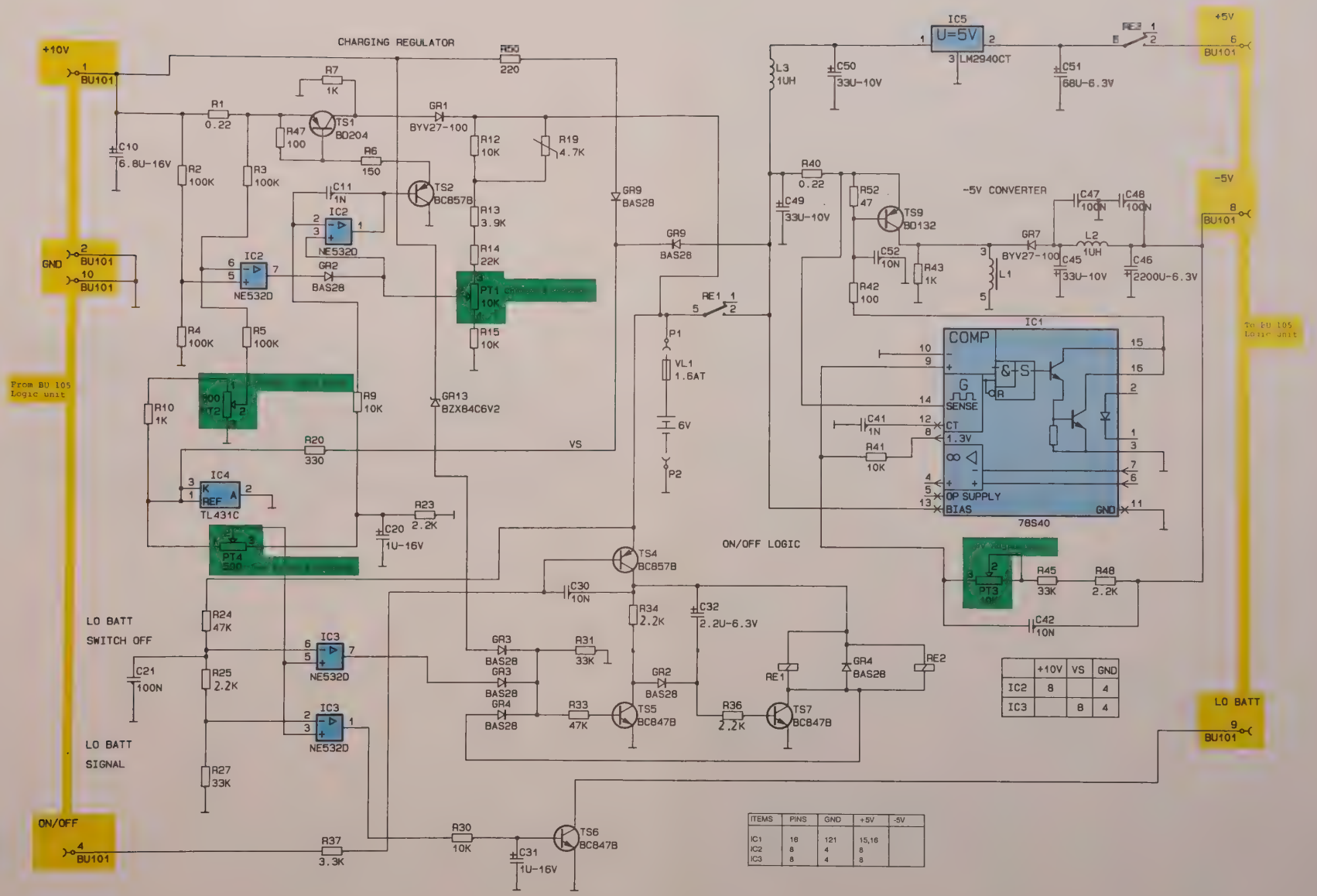
46170 02


UNREGULATED POWER
From BU 105 Logic unit
GND
GND
5 MHZ
SCL
SDA
BU102
R8
47
TS1
BD136
IC6
U=5V
7805
C2
470N
C3
470N
C4
10N
C5
10N
C6
10N
+5V
IC4 PIN 20
GND
IC4 PIN 10
C1
1U-40V
GR1
1N4148
IC2
CPU
MAB8440
XTAL1
XTAL2
RESET
P10
P11
P12
P13
P14
P15
P16
P17
INT/T0
T1
SCLK
P23
P20
P21
P22
P00
P01
P02
P03
P04
P05
P06
P07
IC1
GPIB
8291A
CLOCK
RD
WR
RESET
RS0
RS1
RS2
CS
INT
DREQ
DACK
TRIG
EOI
SRQ
REN
IFC
ATN
NDAC
NRFD
DAV
T/R1
T/R2
D0
D1
D2
D3
D4
D5
D6
D7
DIO1
DIO2
DIO3
DIO4
DIO5
DIO6
DIO7
DIO8
IC3
75161
EN1
EN2
EN3
IC4
75160
M2
1, 2V/
1, 2Ω
OPTION
To Logic unit
EOI
SRQ
REN
IFC
ATN
NDAC
NRFD
DAV
DIO1
DIO2
DIO3
DIO4
DIO5
DIO6
DIO7
DIO8
GND
SHIELD
SHIELD ON BU101
B 1
B 2
B 3
B 4
B 5
CR/LF
SW1
IC5
40097
R1
47K
ITEMS
PINS
GND
+5V
-5V
IC1
IC2
IC3
IC4
IC5

46110 01

PM 9605 Battery Unit

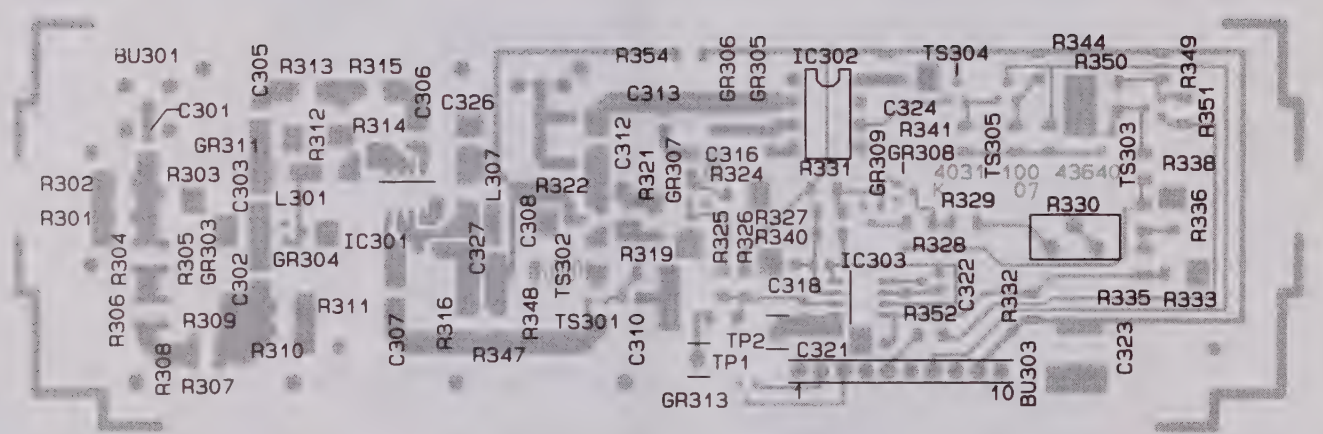




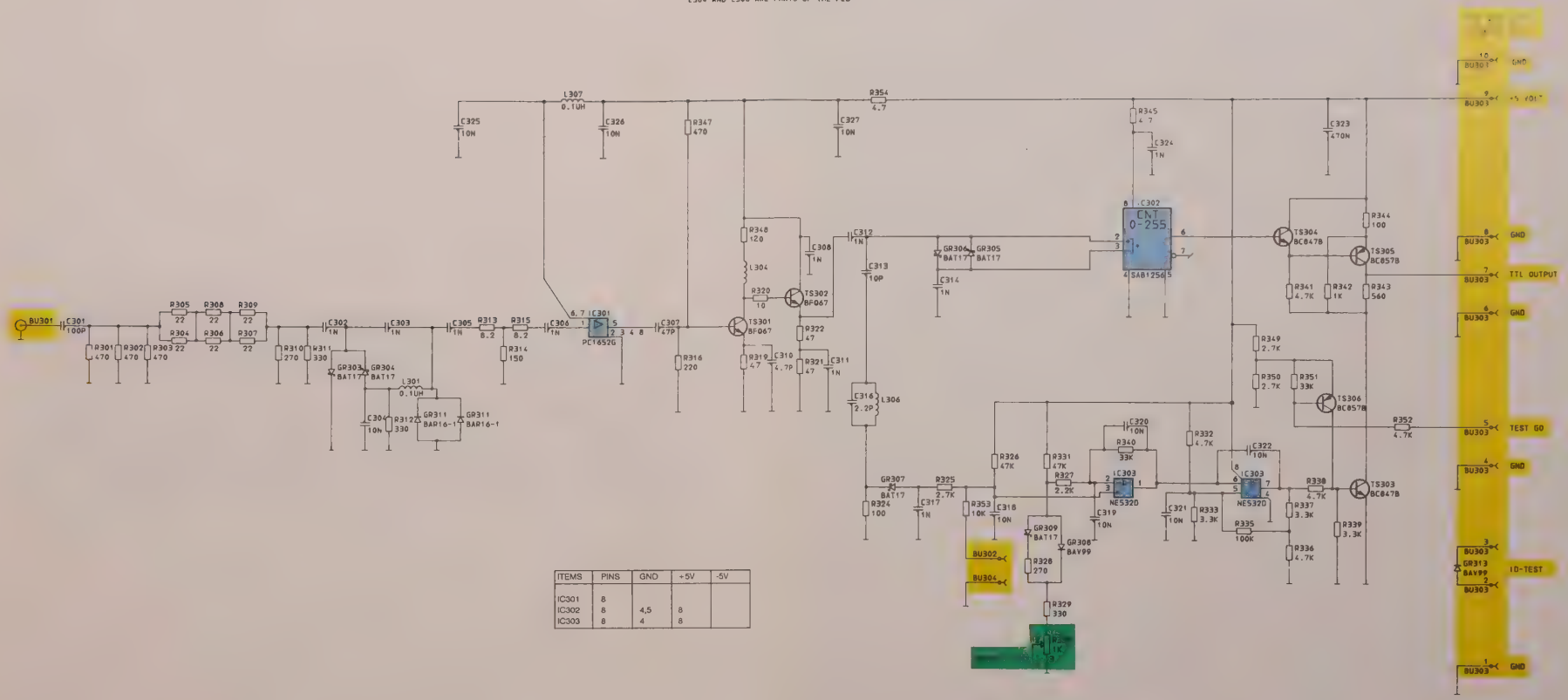
	+10V	VS	GND
IC2	8		4
IC3		8	4

ITEMS	PINS	GND	+5V	-5V
IC1	16	121	15,16	
IC2	8	4	8	
IC3	8	4	8	

PM 9608 1.1 GHz HF Input

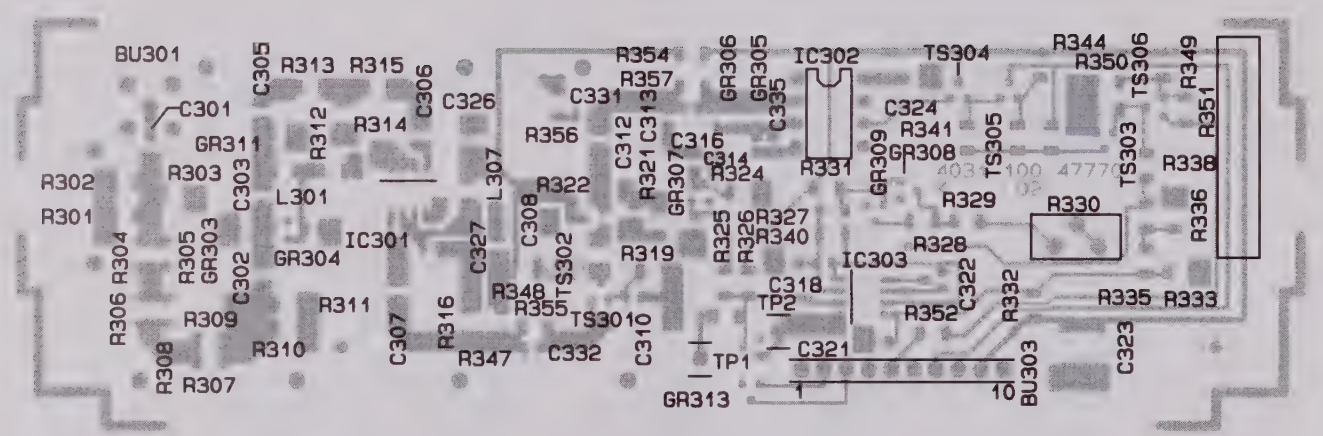


L304 AND L306 ARE PARTS OF THE PCB

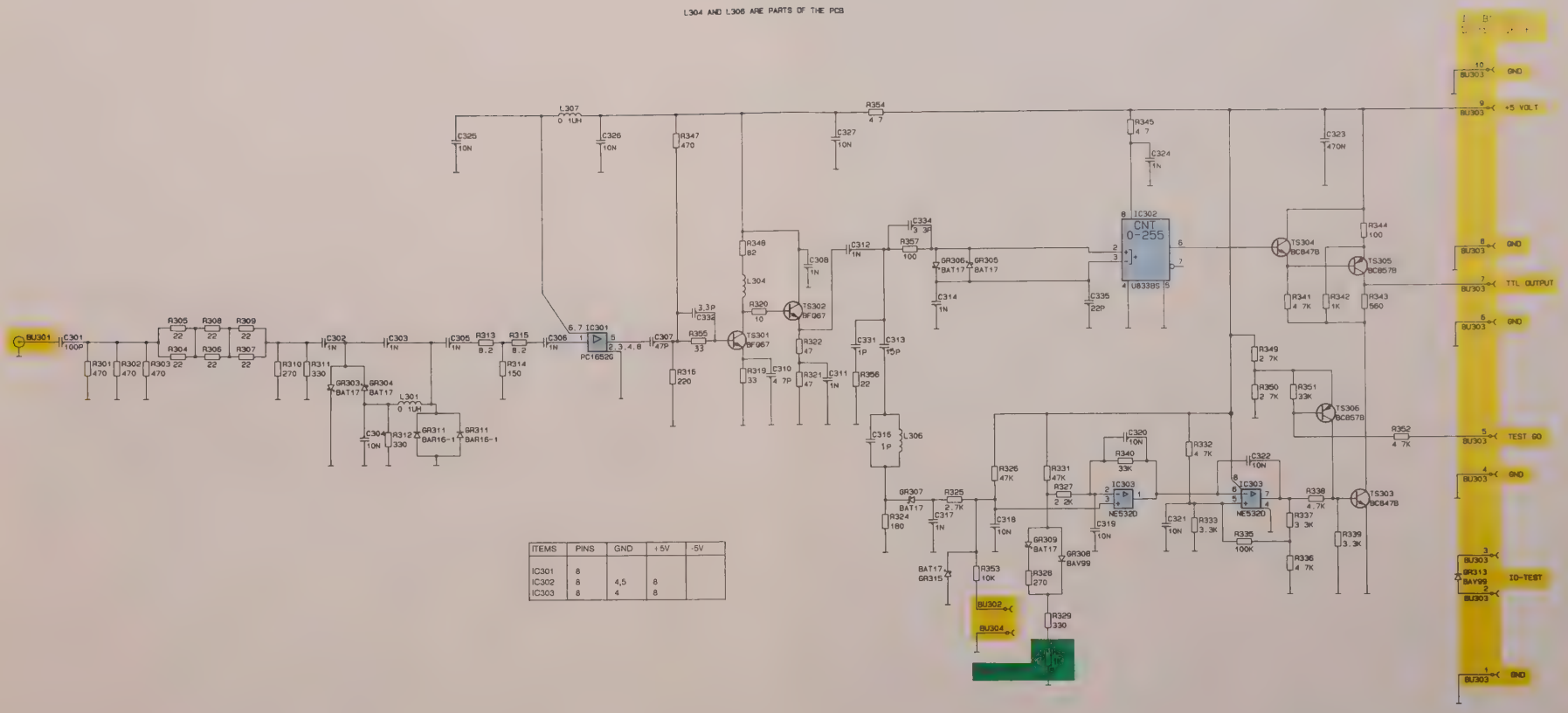


ITEMS	PINS	GND	+5V	-5V
IC301	8			
IC302	8	4,5	8	
IC303	8	4	8	

PM 9608B 1.3 GHz HF Input

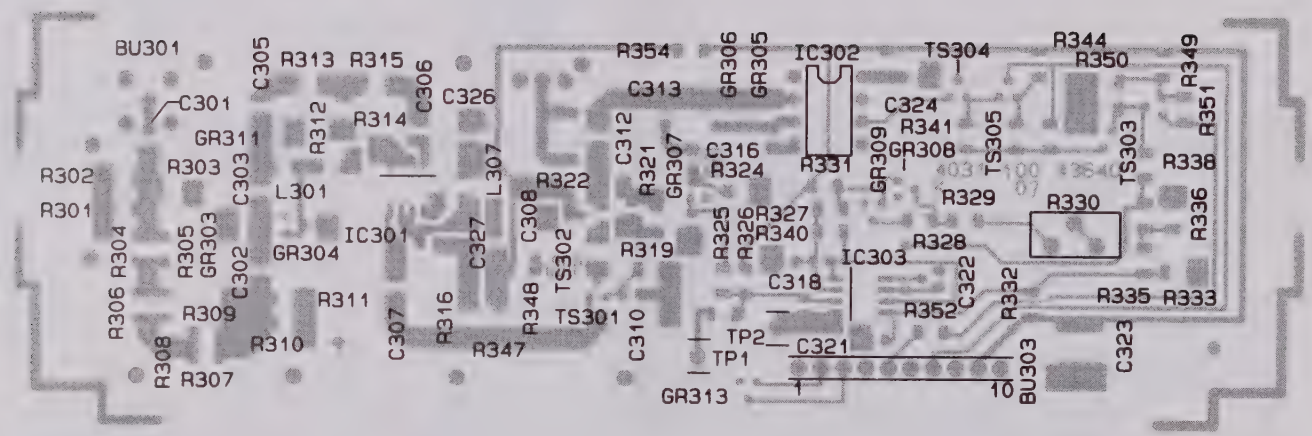


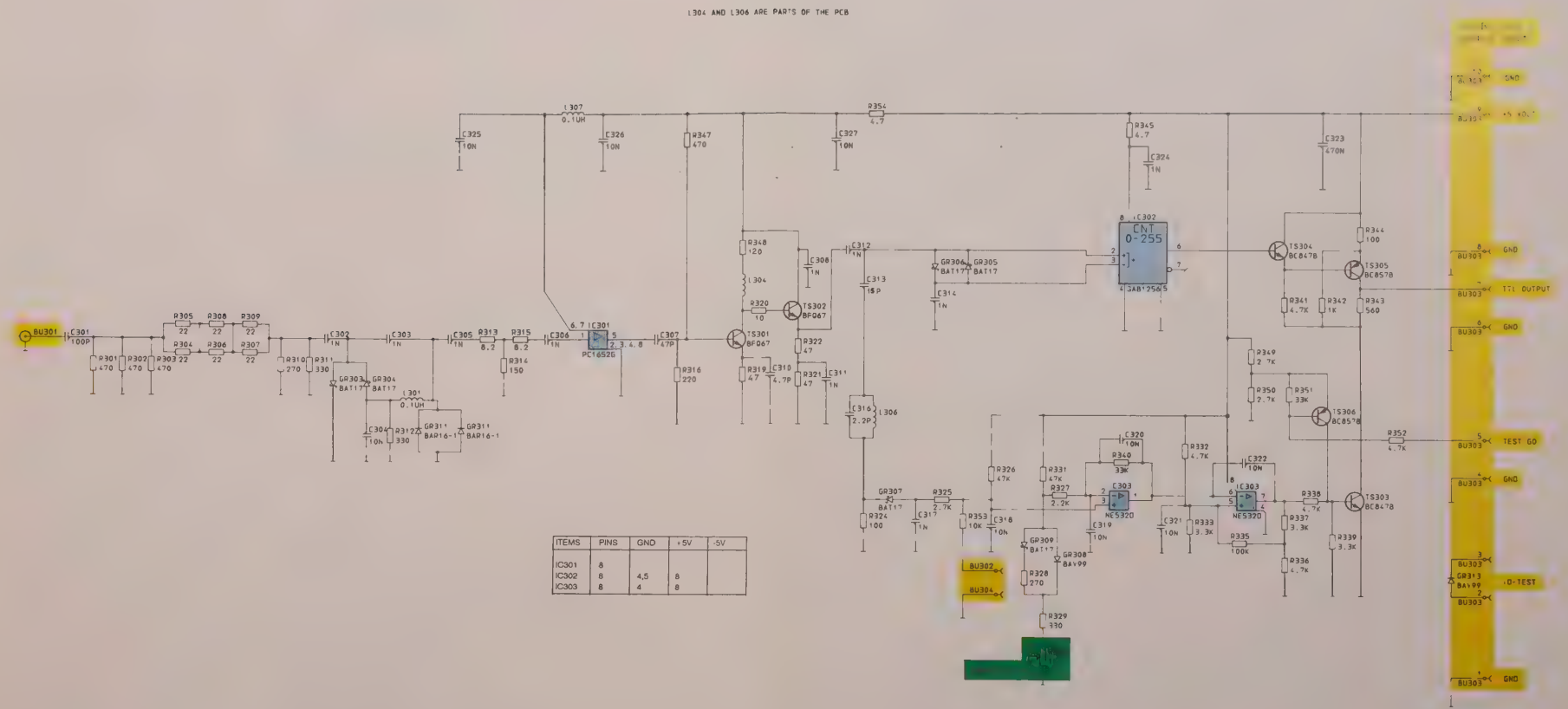
403 100 47770 02



ITEMS	PINS	GND	+5V	-5V
IC301	8			
IC302	8	4,5	8	
IC303	8	4	8	

PM 9615 1.0 GHz HF Input





ITEMS	PINS	GND	+5V	-5V
IC301	8			
IC302	8	4,5	8	
IC303	8	4	8	

APPENDIX

Electrostatic Discharge

Almost all modern components have extremely thin conductors and metal oxide layers. If these conductors or oxide layers are exposed to electrostatic discharge they will either break down immediately, or else become damage, which will inevitably lead to breakdown at a later time. The ESD sensitivity of MOS and CMOS components has been known for quite a while, but nowadays, bipolar semiconductors and even precision resistors are ESD sensitive.

Consider all components as being sensitive to electrostatic discharge.

The text below explains how you can minimize the risk of damaging or destroying these devices by being aware of the problems, and leaning how to handle these components.

ESD devices are marked on the packing material of the replacement part with the following symbol:

- Never open the container unless you are at an ESD protected work station.
- Use a wrist strap grounded via a high resistance.
- Use a grounded work mat on your work bench.
- Never let your clothes come in contact with ECD sensitive equipment, even when you are wearing a grounded wrist strap.
- Never touch the component leads.
- Never touch open connectors.
- Use ESD-safe packing materials.
- Use the packing material once only.
- Keep paper and non-conductive plastics materials, etc, away from your workbench. These may block the discharge path to ground.

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